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Online Problem-Based Learning or: How I Learned to Stop Worrying and Love Microsoft Teams

A Techno-Anthropological case study of online learning activities at Aalborg University during the COVID-19 lockdown.

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Abstract

During the spring of 2020, a nationwide lockdown occurred in Denmark due to the COVID-19 virus outbreak, and as a result, all educational institutions were closed for physical activities. This resulted in all learning activities being forced online, and thus created a unique opportunity for exploring what does and does not work in an online setting. This project seeks to understand how Problem-Based Learning and the Aalborg Model at Aalborg University are affected by this move. This understanding was sought through Deweyan pragmatism and a post-phenomenological reference point. Using the intrinsic case study as a frame for the study, interviews and participant observation were utilized to understand how PBL unfolded online at AAU. This study concludes that technological mediation in online learning activities has a profound effect, and without adjusting the curriculum for an online context, AAU's goals for PBL will greatly suffer. We call for further research into what happens with PBL when it shifts online, and for other researchers to use this study as a foundation for further action. Furthermore, we reflect upon how pragmatism and post-phenomenology complement each other, and how ethnographic methods being purely online has affected our results while being performed within the researchers' own institution.

Preface

This report is a master's thesis written by three Techno-Anthropology students at Aalborg University during the spring and summer of 2020. It is a study of the effects on Problem-Based Learning at Aalborg University when learning is experienced through technology-mediated online learning activities during the COVID-19 lockdown. The background of this study is based upon the imminent situation following the lockdown, to which experiences of educators and students have provided insights into how online learning activities were unfolding and perceived. By examining the effects of the shift onto exclusively online technologies, the desired outcome is that the experiences presented throughout will benefit further research and individuals occupied with online learning activities. It consists of multiple ethnographic observations of lectures and interviews with students, educators, and experts. Furthermore, theoretical considerations stemming from pragmatism and post-phenomenology have been incorporated into the epistemological and ontological framework of this study.

This study intends to summarize important aspects and recommendations that hopefully can support Aalborg University or similar institutions with knowledge that can be used for improving or adapting to coming situations related to online learning activities.

Finally, we want to thank everyone that has contributed to this study; our supervisor Stine Willum Adrian. A big thanks also go out to Rune Hagel Skaarup from CDUL, Professor Thomas Ryberg, and every student and educator that engaged with us to provide data for the project. Without these contributions and support, the project would not have been the same.

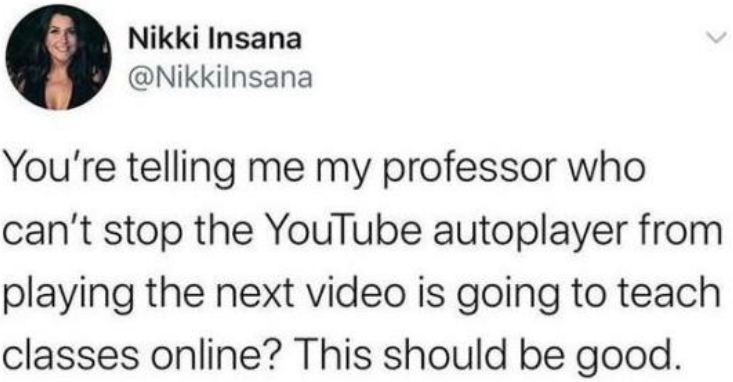

Illustration 1 - Online Learning Tweet (Nikki Insana 2020)

1 Introduction

During the end of 2019, the COVID-19 virus emerged and ravaged the Wuhan region of China. For months it seemed like a problem mainly for southeast Asia, but during the start of 2020, it spread to the rest of the world with Europe being hit hard. In Denmark, on March 11th, the same day as the virus outbreak was declared a pandemic by the World Health Organization (WHO 2020), the prime minister of Denmark announced a lockdown of the country (State department of Denmark 2020). Every public employee was to be sent home, the majority of institutions were closed and private companies were encouraged to do the same. At the time it was set to last for 14 days. A few days later the Danish borders were closed. Similar approaches were taken in other countries either before or shortly after, including France, Italy, Holland, and the USA.

For institutions of higher learning, such as universities, this posed a unique situation. How is it possible to maintain the teaching, research, and supervision of students throughout this period? The shift to online platforms was quickly announced. Suddenly every single class needed to be conducted online. This posed a huge problem, how is it possible within a few days to restructure courses to be taught online? This is where a unique opportunity presented itself for us.

The possibilities of using online technology for education have for many years been present, but for students and educators alike, challenges have been attached to the teaching format. ICT has been a major ingredient in the facilitation of learning at educational institutions, as the technological progression worldwide has meant a steady increase in the amount of ICT-users (International Telecommunication Union 2018). This increase has manifested itself in how educational institutions on all levels structure and organize their learning activities (Ibid.). Since many individuals interact and use different types of technologies daily, it has been found reasonable to incorporate different forms of mediums and platforms into different areas of practice within the learning institutions (Duncan, Smith, and Cook 2013). Most often, ICT acts as a complementary component in the structuring of the learning activities, although, in recent times ICT has also been used during some learning activities (Fortune 2012). The same is true for Aalborg University (AAU), as ICT and digitalization has been and still is an area of focus (AAU 2018). While some might have predicted it, for most, the radical change that came with COVID-19 and the subsequent lockdown; how to organize and structure education and learning activities, which were now exclusively online activities. Across several institutions, countries, and cultures, the situation is the same. This makes the unfortunate situation of the COVID-19 pandemic a unique opportunity to study the effects of online teaching, and more importantly how to improve it. In a sense, it is a global large-scale test of online teaching. At this very point in time, a vast

amount of knowledge will be created regarding how to change curriculum, how to interact with students, what disciplines can easier adapt, or how it affects administrative staff. How can the knowledge created be used to improve the medium and approaches to it? Will this be a chance to improve learning outcomes or an exercise in saving money? Will there be an effect of this change in the exams and grades for affected students? Will a younger generation of teachers, more familiar with ICT, do better than the previous generations? These are just some of the relevant questions that should be investigated right now!

In this project, we seek to explore and investigate the experiences of the current pandemic concerning how universities can facilitate online learning activities. More specifically, we will examine how AAU has approached the situation and how the digital technologies affect the Problem-Based Learning (PBL) paradigm present at AAU. We want our project to bring insights valuable for AAU, and act as a basis for understanding the pitfalls and possibilities about online education. Our study will have a socio-technical view and analysis, through which we examine the technical aspects concerning the social world of the involved actors. Our project is based upon numerous interviews with actors involved in online education and observations of multiple online learning activities. Through our project and analysis we seek to answer the following problem statement:

What are the effects on Problem-Based Learning at Aalborg University when learning is experienced through technology-mediated online learning activities during the COVID-19 lockdown?

The following subchapter will present a literature review conducted at the beginning of the project, which helped us to gain an overview of the recent academic contributions within the field of online education and PBL. Furthermore, it was a tool for us to identify knowledge gaps in the literature.

This project seeks to study and pinpoint knowledge created during this pandemic and mandatory online teaching at AAU. Via online participatory observation in classes being held, interviews with educators and students to understand their experiences, this study seeks to provide a holistic understanding of some of the effects of online learning activities. The analysis will result in a series of recommendations for both AAU and other educational institutions seeking to implement, or improve how they facilitate, online learning activities.

1.1 Review of Literature: Digital learning and PBL

The following literature review is the product of a thorough systematic process of collecting, sorting, understanding, and interpreting contemporary research within the field of PBL and online learning. By selecting and constructing search terms related to the different spectrums of facilitating online learning activities, the literature has been gathered from four databases: *ERIC, Scopus, Academic Search Premier,* and *Education Database*. Each article has been sorted through specific criteria of relevance, such as keywords, scope, and context, to filter out non-relevant articles for our scope. Through multiple iterations of the final collection of relevant articles, different themes emerged depicting the current knowledge available. A more thorough protocol describing the literature review process can be found in Appendix A.

The current state of digital learning encompasses multiple sources of technology and technological mediated processes, which stems from the incorporation of didactical and pedagogical perspectives into digital learning methods. Previous literature within the field of PBL has found that the increase in digital mediums is seen as natural due to the number of interactive media available to support the learning activities (Duncan, Smith, and Cook 2013). PBL as a learning philosophy focuses on solving real-world problems, which earlier research

has demonstrated can benefit from the incorporation of digital technologies to achieve specific competencies such as critical thinking or collaboration (Park 2017; Scholkmann 2017). Transferring this approach into the digital realm and the availability of online technologies creates different challenges regarding how to ensure the transition is beneficial both for the students and teachers (Nagge, Killeen, and Jennings 2018). When applying PBL perspectives in the digital sphere, it is important to consider how the involved actors are perceiving the materials and mediums being used, as both maintaining the student-teacher interaction and establishing relevant learning activities are essential for a valuable outcome (Ng et al. 2014; vanOostveen, Desjardins, and Bullock 2019). Several elements play a role in organizing digital learning and the learning environment, which previous research has illuminated. By incorporating the traditional notions of physical learning elements into the domains of ICT, novel learning processes can transpire from interacting on various platforms or using different media for lectures or presentations (Fortune 2012; Ünal and Çakir 2017). These can include but are not limited to, the incorporation of Learning Management Systems (LMS) video lectures, cloud-based services (such as Google+), or social media platforms (Ng et al. 2014; Steinø and Khalid 2017). This can, as an example, be found within the concept of the Problem-Based Learning Environments (PBLE) and Problem-Based Learning Objectives (PBLO), wherein lectures include online videos for collaborative discussions (Hartnett, St. George, and Dron 2011; vanOostveen, Desjardins, and Bullock 2019).

Two closely related concepts that both refer to the dimensions of digital learning are *flipped classrooms* and *blended learning*. Whereas learning and teaching processes traditionally have been applied within a physical setting, flipped classrooms can be perceived as digitally constructed classrooms (Schwartz 2014). It has also been described as reverse learning since it shifts the learning environment to the students' private homes and turns passive learners into active ones (Park 2017). Furthermore, previous research has within this field highlighted the importance of transferring the students' untapped digital capabilities into the actual learning approaches offered, which can become a challenge if the implementation is not done correctly, as both facilitators and students must be comfortable with the mediums used. (Kim et al. 2016; Schwartz 2014). Blended learning encompasses many of the same attributes as flipped classrooms, by also applying the usage of digital technologies within the learning processes. Blended learning as a pedagogical approach incorporates digital systems, e.g. LMS or video-conferences, as a means for combining face-to-face interaction with computer-mediated instructions (Steinø and Khalid 2017). When the learning activities become remote, it is important to be aware of how the outcome can resemble, or perhaps even improve, the learning and teaching situations. Herein, interaction becomes essential since many of the learning processes must be upheld and include guidance for the students, as the interactions occurring are dependent on the technology-mediated context (de Jong, Krumeich, and Verstegen 2017; Donnelly 2010). One of the reasons to include blended learning perspectives into teaching and learning activities is the extended capabilities of communication, which opens up different possibilities regarding both the student-teacher interaction but also the eventual group work between students. As the interaction transpires on digital platforms, the formal teaching process must to a certain degree become informal to accommodate the element of distance (Donnelly 2010).

When teaching and learning activities shift onto ICT, a distinction can be made between two forms of deliverance: *synchronous* and *asynchronous*. Which of those to choose are mostly dependent on the context of the concrete teaching at hand, although both can be applied (Duncan, Smith, and Cook 2013). The majority of the articles found in this literature review has a focus on the effects of online teaching methods when courses incorporate distance learning, either fully or sporadic. Synchronous teaching often involves the students and teachers being together on a digital platform with the possibility of real-time video and audio feeds (Ng et al. 2014). Being physically separated means that many of the physical tools and gestures that can influence teaching must, to some extent, also be present on the digital mediums, if the interaction

between the students themselves and the teacher shall function (Ibid.). Asynchronous forms of teaching come into play as the student-teacher interaction becomes less dependent on being together in real-time. This can either be purely preparational for a synchronous session but it can also be tutorials for the students to walk through (Steinø and Khalid 2017).

As the learning processes and activities become entangled within ICT, there appears to be an important distinction between the users of these. It often depends on whether the focus is placed on a teacher or the students, as the perceptions are influenced by the surrounding educational contexts (Gibbings, Lidstone, and Bruce 2015). Students often find themselves comfortable with the different forms of digital mediums used for teachings, although, as previous research has demonstrated, the learning curve can vary from person to person (Kim et al. 2016; Nagge, Killeen, and Jennings 2018; Schwartz 2014). Many of the digital communication platforms have been used in other contexts by the students, which often makes the technologies easy to engage with and use for group work or supervision sessions (Schnabel and Ham 2012). It has also previously been found that students achieve a greater feeling of responsibility towards the online communities that can and should arise from the online interactions, but also towards professional work (Barber and King 2016). Some scholars argue that the affordances provided by digital technologies can sustain a heightened collaborative effort by the students, often concerning PBL didactic, which can transform the way the students create knowledge (vanOostveen, Desjardins, and Bullock 2019). The digital learning tools and systems can support different areas of educational structures e.g. LMS for organizing learning material or Google+ services for storage and editing of documents (Ramstedt et al. 2016; Steinø and Khalid 2017). Although previous research has found that students frequently find themselves at ease by using different forms of digital tools and methods, the teachers or course facilitators on the other hand are not always familiar with the digital technologies (Sullivan and Freishtat 2013). To accommodate online learning activities, teachers must be able to extract and use mediums or tools for educational purposes. Previous research has findings indicating that for teachers to become successful in digital teaching methods they should attempt to facilitate and structure settings wherein the productive failure is allowed and vary their pedagogic and didactic approaches (Rose 2018). Preliminary preparations of the tutors and facilitators of online courses should also be regarded as important, as the teachers themselves would obtain essential skills and technical know-how (Nagge, Killeen, and Jennings 2018).

As digital technologies used for education are becoming widely available, research has also placed focus on what the actual outcomes are from using these. The learning experience differs from each person but research shows that different competencies often will transpire from working through ICT (Scholkmann 2017; Schwartz 2014). Having to organize and structure routines around e.g. LMS, can lead to students achieving systematic, and in some cases also communicative competencies (Scholkmann 2017). Useful learning experiences will most often have to include both a process and an outcome, wherein the students put effort and engagement to produce something they feel an attachment to (Sullivan and Freishtat 2013). Collaborating on digital platforms has proven to enable the option for a continuous discussion that is not restricted to a physical setting, whether it be on written forums or through voice communication, which also forms the learning experience (Ibid.).

By reviewing literature regarding online learning through a PBL influenced didactic, multiple examples emerge on how to develop competencies through digital mediums and technology. There also appears to be a consensus on the importance of ensuring that both students and teachers understand and accept the given applied technologies for their courses. As PBL in combination with online courses often exists as a partial part of a course or semester, it is found within this literature review that a majority of the articles lack a perspective related to exclusive online PBL approaches. The closest examples can arguably be that of

individuals taking a distant or virtual course and therefore made a decision acknowledging the element of not being physically present. No articles are found to focus on larger scales of massively deployed online courses and teaching in a sudden and critical period due to external factors preventing physical gatherings of people. Likewise, there are close to none articles regarding eventual critical prospects of transforming traditional PBL-influenced teachings into a purely digital form, as the vast majority of research focuses on the apparent possibilities. Furthermore, no articles within our literature review have described the use of webcams within teaching or learning and the effect of using or not using them in regards to interaction during synchronous online learning activities.

In the wake of the extraordinary situation, we have found it relevant to examine what is required of a university to facilitate and execute fruitful and productive online learning activities for its staff and students, while preserving the fundamentals of PBL. How students and teachers maintain a professional and productive attitude towards educational content is therefore principal, as the consequences of steering blindly into digital technologies and online teaching are unlikely to result in the same outcome as a physical learning setting can produce. AAU applies an adapted PBL model to its teachings and student work, which entails, amongst other elements, a focus on acquiring and developing skills for the coming academic and professional future. This version of PBL, the Aalborg Model, will be further explored in chapter 5. A great amount of the research and academic processes are often physically bound to classrooms, rooms for project-groups, and laboratories which the current lockdown situation has made inaccessible. Several authors in the literature review argue for the importance of interaction and transferring it to online teaching, Furthermore, we will investigate the effect of webcams on the interaction happening or lack thereof.

1.2 Problem Statement

Delving into how the transformation of an educational institution unfolds is relevant to explore, not only for the contemporary dimension of deriving situated knowledge but also for future learning potentials. Digital technologies meant for teaching contexts existed before the lockdown and will tentatively be incorporated into future learning and teaching activities. Due to this, it can be argued that many of the outcomes produced by the radical transition to exclusively digital processes, can be utilized for the aftermath of the lockdown. We as techno-anthropologists, also seek to fathom the vast instances of technological mediated processes that transpire across multiple sources of interests. How technologies affect and constitute teachings, course facilitation, and student collaboration should be acknowledged and understood to sustain a similar or improved version of the former educational standards. These considerations have led to the following problem statement for this study:

What are the effects on Problem-Based Learning at Aalborg University when learning is experienced through technology-mediated online learning activities during the COVID-19 lockdown?

To operationalize and answer this problem statement, below we have outlined two research questions. These pinpoint different areas we wish to uncover and explore as we regard them as integral to answering the problem statement within our scope.

- What classifies Problem-Based Learning at Aalborg University, which departments support the facilitation of online learning activities, and how have their efforts manifested itself during the lockdown?

This research question will help to create a foundation for the remaining analysis. Through this research question, we present and analyze the university's adaption of PBL - the Aalborg Model. Furthermore, we will highlight the actions and role of Center for Digitalt Understøttet Læring (Centre for Digitally Supported Learning - CDUL) and IT Service, and the flow of information during the lockdown.

- How have the educators and students experienced and performed online learning activities and what mediative processes occurred with the applied technologies?

The second research question turns the attention towards the students and educators. As this project does not focus on actual learning achieved, we instead analyze experiences obtained during the lockdown. Furthermore, our aim in this part of the analysis is to uncover the interactions and processes students and educators have with technologies utilized and the mediation transpired from it.

While not a research question, an objective for this project is to use the results of the analysis to present suggestions for the future of online learning activities. The third part of the analysis will present a critique of PBL performed during the lockdown at AAU, and provide recommendations for how to improve on online learning activities and areas for further research.

1.3 Scope and Definitions

Given the situation of the studied, online learning activities during a lockdown from a pandemic, and the aim of this project, to provide relevant information for how to facilitate online learning activities and suggestions for further research, an important distinction, and understanding of context is needed. The context of a nationwide lockdown in Denmark, and the consequences for both staff and students at a university, social or professional, will be ever-present in this report. It will not be possible to completely distinguish the context of the lockdown or that of learning activities happening online, but when relevant this distinction will be made visible to the reader.

An often-used term in this report is that of *online learning activities*. Through the use of the Aalborg Model, AAU utilizes various activities that are aimed towards facilitating learning for its students. These can include lectures, status seminars, supervision, workshops, or project work amongst the group themselves. Therefore the cover-all term of online learning activities will be used regarding any activity that is happening online and facilitates learning amongst its participants.

The term *educators* are used to describe the teaching staff at AAU since we found the term teachers too narrow for a university context. Any staff that in any way facilitates online learning activities will be described simply as an educator.

Another distinction we want to make is how we will use the terms *digital* and *online*. Often they are used interchangeably, however in our study they are not. Online refers to anything that happens via the internet, often but not always meaning distance. Digital is when software is used, for instance, AutoCAD or Microsoft Teams, or when a computer is used, and it has significance for the contextual understanding. Mostly, we will use online as it is a more cover-all term; when digital is used it is when it has significance for the context.

The term COVID-19 lockdown will be used throughout this report. It refers to the state of lockdown in Denmark from March 11th and for the rest of this project period, ending August 3rd. While the lockdown went

through several phases during this period and shifted in severity, for AAU it remained a definition of physical restriction.

1.4 Case

In this last section of the Introduction, we will present our case and describe the setting, context, period, and the actors involved in our case study.

Our research has been carried out during the spring and summer of 2020, where the COVID-19 pandemic caused Aalborg University, amongst other universities, to move their activities online. We had an ambition of investigating how the use of these digital technologies affected the learning and teaching at AAU. At AAU, all educational programs are based on the Problem-Based Learning paradigm and the Aalborg Model, in continuation hereof, it has been central for us to see how PBL is affected and practiced online through these digital technologies.

This is a qualitative study based on interviews with different actors within AAU, along with observations of lectures and a single group project exam. The data collection has been conducted solely online. Our interviewees have primarily been students and educators at AAU, from both the Aalborg and Copenhagen campuses. In addition to the interviews with students and educators, we have conducted two factual interviews, one with a researcher at AAU who studies e-learning and PBL, the other with an employee at the Center for Digitalt Understøttet Læring (Centre for Digitally Supported Learning, CDUL). Our methods for data gathering and data analysis will be presented in-depth in chapter 3.

We ourselves are students enrolled at AAU, and several of our interviewees are acquaintances of one or more of us. Our background as students at AAU posed both challenges and opportunities for us; most ethnographic research requires researchers to contentiously shift between an emic and an etic perspective (Headland 1990). As AAU students we had relative ease gaining access to the emic insider-perspective, but the shift to etic outsider perspective required more effort. We acknowledge that we as researchers affect the data that we generate, and we do not try to achieve a "(...) *conquering gaze from nowhere.*" (Haraway 1988, p. 581), instead, we will try to reflect upon our impact on the field and the data. A further description of our ontological and epistemological standpoints can be read in the following chapter and a discussion of these in chapter 8.

2 Theory

In this chapter, we present our theoretical approaches to our project and our ontological and epistemological understandings. These include Dewey's pragmatism, post-phenomenology, and our techno-anthropological understanding of the world. Each will be presented on their own, how we will combine them in this project, and what each of them will contribute with.

2.1 Pragmatism

Consciously or unconsciously the world which we inhabit can be perceived and understood by the notion of experience, beliefs, and actions. These elements can be approached from several distinctive philosophical traditions, which each offer a certain worldview. This span covers traditions from the natural sciences, such as the positivistic philosophy of science, to social sciences, wherein pragmatism is found (Creswell 2007). As history demonstrates, these traditions have progressed through time, and it is possible to use a positivistic approach to social science research and vice versa.

Pragmatism as a philosophy of science dates back to the philosopher Charles S. Peirce (1839-1914) and his article *How to make our ideas clear* (1878), which presents the notion of ideas as tools of knowledge and action.

"A clear idea is defined as one which is so apprehended that it will be recognized wherever it is met with, and so that no other will be mistaken for it. If it fails of this clearness, it is said to be obscure." (Peirce 2016, p. 288)

The predecessor for the philosophical pragmatism can be found in Peirce's description, as he contests the Cartesianism deeming nature of perceiving mind and body as separate parts. The early pragmatism is born out of the belief that knowledge transpires from multiple sources of interest, as the subjective self cannot produce ideas or knowledge separate from the world they inhabit (Dewey 2004). Therefore is it necessary to acknowledge how beliefs affect habits and how conceptions can change if the individual experiences doubt.

What currently can be considered classical pragmatism builds upon the ideas of Peirce and one of the great contributors, John Dewey (1859-1952), which sought to expand the understanding of how to process the situations which constitute reality.

2.1.1 Theory of Inquiry

One of the most known concepts formed by Dewey is the *theory of inquiry* which was formulated in 1892 as a scientific and philosophical idea on how to understand, interpret and solve a given problem (Hickman 1992). Within this idea is the notion of turning to previous experiments and derived knowledge, as these are what represent prior validated ideas meant for realizing former mistakes concerning the current problem at hand.

Dewey grounds his assumptions in the importance of the accumulated experiences of an individual to process former incidents and happenings from which the affected can reflect upon, as former memory becomes tools of latter action (Dewey 2004).

"Men tried certain acts, they underwent certain sufferings and affections. Each of these in the time of its occurrence is isolated, particular its counterpart is transient appetite and transient sensation. But memory preserves and accumulates these separate incidents. As they pile up, irregular variations get cancelled, common features are selected, reinforced and combined." (Ibid., p. 79)

The belief in the natural sciences', that there exists a separate and unquestionable truth independent of the subjective perception, is deemed inadequate by pragmatists. Dewey's pragmatic understanding contests the fact by arguing for the importance of how individuals are learning, adapting, and continuously throughout a lifetime construct and reconstructs the applicable common-sense (Ibid.).

From a techno-anthropological perspective, the theory of inquiry can be perceived as a possible explanation of how technology can be multifaceted and multifunctional. For example, when designing or implementing technological solutions into a setting, whether it be organizational or societal, users might have different views regarding multiple aspects. Establishing and interpreting knowledge as a focus in a context can support an inquiry with details and a language which in return can be sources of experience (Hickman 1992). By drawing on previous and current experiences and knowledge, the pragmatist can potentially help settle or guide technological disputes, as referring to the view of the pragmatic understanding by Peirce and Dewey.

2.2 Post-Phenomenology

Phenomenology is a philosophical tradition aimed at uncovering phenomenons, experiences, perceptions, and essences of individuals. It has origins in continental philosophers such as Edmund Husserl (1859-1938) and Martin Heidegger (1889-1976), among others, at the start of the 20th century (Molchanov 1989). Husserl formed phenomenology as an opposition to the, at the time, understanding in the natural sciences and psychology of how to understand the world. He argued that it is not possible to know without experiencing and thereby contradicts the notion of trandenscental truths.

"*Natural cognition begins with experience and remains within experience. In the theoretical attitude which we call the "natural" theoretical attitude, the collective horizon of possible investigations is therefore designated with one word: It is the world. Accordingly, the sciences of this original attitude are, in their entirety, sciences of the world; and, as long as it is the exclusively dominant theoretical attitude, the concepts "true beings," "actual being," that is, real being and since everything joins together to make up the unity of the world - "being in the world" coincide*" (Husserl 1983, p. 6)

For this project, phenomenology, in the traditional sense, will not be utilized, but instead, post-phenomenology will be incorporated into our understanding of technological mediation, as it can support the pragmatic worldview by concepts revolving around the relationship between humans and technology. This addition to the traditional understanding of phenomenology originated from Don Ihde (1990) and his concepts of technological relations. In phenomenology, a core concept is that within technology there resides an essence that makes the technology what it essentially is.

The concept can be argued to have roots back to Plato (428/427-348/347 BC) and his thoughts of the essence of objects, the perfect specimen, that exists only in a different plane of existence. Every person will recognize

a tree when they see one, even though trees come in many different forms, shapes, and sizes, but every tree is rooted in the perfect form of a tree (Perl 1999). In opposition to this is Immanuel Kant (1724-1804) and his concept of *Ding an sich* (thing-in-itself), where he argues against the notion that humans can perceive the thing in itself. *Ding an sich* describes a way things are, not as they are experienced; how they are perceived is the *Ding fur uns*. (Kant 2009)

2.2.1 Ihde, Multistability and Human-Technology Relations

The human-technology relation in post-phenomenology, as presented by Don Ihde, is not a new concept. It is a continuation of Heidegger's work, in which he argued that in the design of any technology will be an intentionality built into the design, that manifests how it is intended to be used. The design of a hammer is to hammer things, the handle is for holding and the head for hitting (Heidegger 1962).

"[...] *where something is put to use, our concern subordinates itself to the "in-order-to" which is constitutive for the equipment we are employing at the time; the less we just stare at the hammer-Thing, and the more we seize hold of it and use it, the more primordial does our relationship to it become, and the more unveiledly is it encountered as that which it is - as equipment.*" (Ibid., p.98)

In the quote, Heidegger explains how the essence of the hammer will guide its use and the user. By its shape and design it will afford a use, and from this reveal its essence. It has one use; a hammer. Ihde breaks with the idea of essence in technology and the more simple human-technology relations from Heidegger. Instead, he presents his concept of multistability. For Ihde, technology does not have an essence; technology is manifested through its use which is not given *a priori* but through the context of its actual use. There is no innate "chairness" to a chair; if used for sitting it is a chair, but it can be used as a bookshelf, for firewood, as art, or many other uses. Technology cannot be anything in isolation but are technologies-in-use. This is the multistability of a technology, which for Ihde is a central concept and thus also a diversion from earlier phenomenological thinkers. (Ihde 1990)

As for technology and their place in the world, Ihde argues that humans never were or will ever be able to live in a society that is not shaped by technology and vice versa, as human life cannot exist without the aid of technology. Therefore, a study of the human-technology relation must always look at how technologies are mediating within the experiences of subjects (Ibid.).

Ihde presents four different ways of understanding how technology and humans relate to the world, in a relationship with each other. These are Embodied Relations, Hermeneutic Relations, Alterity Relations, and Background Relations. These will be central to this study's analysis.

Embodied relations are when technology forms a unity with the individual through its use. A microphone being talked through or a student in a Microsoft Teams session using features to extend the physical body will constitute an embodied relation between the user and the technology. None of these technologies are looked *at*, as they, in functional relations, will appear invisible to the eye. They become an extension of the user's ability or senses, and as such an extension of their body, hence an embodiment. (Ibid.)

Hermeneutic relations are when technology helps to interpret the world for the user. An example is when an educator looks at the number shown in Teams for how many students are in their call. Where in embodied relations the human forms a unity with the technology, instead in hermeneutic relations, the technology form a unity with the world for the human to interpret. (Ibid.)

Alterity relations are when humans interact with technologies in a way that backgrounds the world. Examples of this type of relation are a student's email account being open in a browser tab when an email arrives the browser tab will produce a sound and suddenly the email account becomes central for the student and they engage in an alterity relation. (Ibid.)

The fourth and final of Ihde's technological relations are **background relations**. In this relation technologies, themself are the experience and are intertwined with the world. A successful background relation in an online learning context is when a Microsoft Teams call is functioning without issues and the student becomes so emerged in the experience they forget the fact that they are engaging in a lecture through their computer. When an element disturbs the immersion, the background relation becomes visible. (Ibid.)

The technological relations will within this study act as explanatory tools from which to examine the processes that occur when students or educators engage themselves with digital tools during the lockdown. By delving into the different mediative processes, a greater understanding of the experiences that constitute the perceptions can be achieved, which potentially can help uncover how problematic situations were unfolding and how valuable lessons learned can become beacons of inspiration for the future design of online learning activities.

2.3 From Dewey to Ihde to Techno-Anthropology

In the last two subchapters, our perception of the two theoretical directions presented above will be outlined, both concerning how other researchers and philosophers have applied them, but also how we intend to use them. Following that, we will tie these understandings in with a techno-anthropological one and present our ontological and epistemological understandings that will guide the methods, analysis, and findings of this project.

2.3.1 Pragmatism and Post-Phenomenology

The two paradigms within philosophy of science applied in this project share a similar focus regarding technological and instrumental influence on human society, although, varying in degree (Selinger 2006). The pragmatic paradigm is not explicitly mentioned as a predecessor for post-phenomenology, but both Dewey and Idhe sought to explore how tools and artifacts, often mentioned as technology, are influencing experiences and concrete actions within different situations and contexts. Dewey's pragmatic understanding of technology was encircled around his theory of inquiry, wherein tools should be incorporated as explanatory components in the description of given problems and solutions.

"Because of the stress placed on the instrumental character of logic, and indeed of all human inquiry, Dewey's special version of pragmatism is sometimes termed instrumentalism. Dewey nevertheless did not take the step of calling his approach a philosophy of technology." (Selinger 2006, p. 23)

Although Dewey did not explicitly perceive pragmatism as a philosophy of technology, he did recognize that instruments and technology often could have been used interchangeably (Ibid.). Hickman, which draws upon the work of Dewey, has since made a theoretical connection between pragmatism and technology:

"First, they may use tools or artifacts, or they may not. Second, those that use tools may do so deliberately or merely habitually. Third, those that do not use tools may either be cognitive or noncognitive." (Ibid., p. 28)

The description made by Hickman above, resembles in many ways the post-phenomenological perceptions of Idhe, as technology in the view of Hickman, plays a critical role in many activities. Technology is both within and outside human perception and cognition, which post-phenomenological concepts, such as Ihde's types of relations, also entails. Ihde also shares an acknowledgment of the mediations occurring between humans and technology, although, by drawing upon a phenomenological paradigm.

"By weaning phenomenology from any residual foundationalist pretensions, as well as bringing it out of the more purely philosophical traditions and introducing it into the scientific laboratories and their heavily instrumented practices, Ihde has created a postphenomenology that is, in effect, a pragmatic phenomenology." (Ibid., p. 31)

The core of post-phenomenology circles around an individual perception of the sum of accumulated experiences constituting practices within a lifeworld, whereas pragmatism, regarding a Deweyan perspective, shares the same points regarding experiences but tends to favor pure natural instrumentalism.

John Creswell (2003), an academic and author of 27 books on mixed methods, argues that pragmatism has what he deems as a world view, and what we would deem fundamental ontological and epistemological paradigms, which does not exclude other world views. In pragmatism what is evident, is what is right before us. Using different theories or methods in conjunction with pragmatism is still working within the pragmatic paradigm. For our research, the combination of pragmatism and post-phenomenology does not represent two different ideologies, but instead two complementary ones that support the structure we build our research upon.

Pragmatism, in the Deweyan sense, is a way to frame and understand situations and experiences happening for actors we have studied. How students and educators experience the world and online learning activities during the lockdown, and how they learn and evolve from these experiences is how Dewey and pragmatism will help shape our analytical process. Post-phenomenology is used to understand technological mediation and how human beings relate and use technology in the world that surrounds them. The concept of multistability is for us a way to understand how people engage with technology, but more importantly, it frames how technology is nothing on its own, but through use will have meaning and effect on the world and its users around it.

2.3.2 A Techno-Anthropological Understanding of the World

In this last section, we will present how we as techno-anthropologists view the world, how we epistemological approach knowledge production, and how this ties into both our presented theoretical paradigms and the work done in this project.

An overarching understanding within Techno-Anthropology is that technology is not a mere neutral tool to be used without any implications. Any technology, from a smartphone to a chair, will mediate its use and change the world around it through use. A socio-technical understanding is ever-present in our understanding of the world and the relationship between humans and technology. This understanding stems from the influence of STS (see for instance the work of Latour, Verbeek, Bijker & Pinch, Winner, Haraway) and as such a critical awareness of how ethical considerations within technological use and design affects a

vast amount of human-technology interactions; hence a societal impact. Furthermore, contextual knowledge and understanding are always needed to fully grasp a problem; nothing exists on its own without implications around it.

We regard knowledge as co-produced, not found or explored, between humans in an intersubjective relationship. What we know, we know through engagement with others in trying to understand them. Through qualitative methods that aim to understand the world of the studied and their experiences, we investigate and build upon our knowledge and understanding, while also through methods that are intersubjectively changing the studied/informants in a reciprocal and symbiotic knowledge-producing relationship.

Tom Børsen (2013) outlines in *What is Techno-Anthropology* a model that highlights the different techno-anthropological competencies, shown in illustration 2 below:

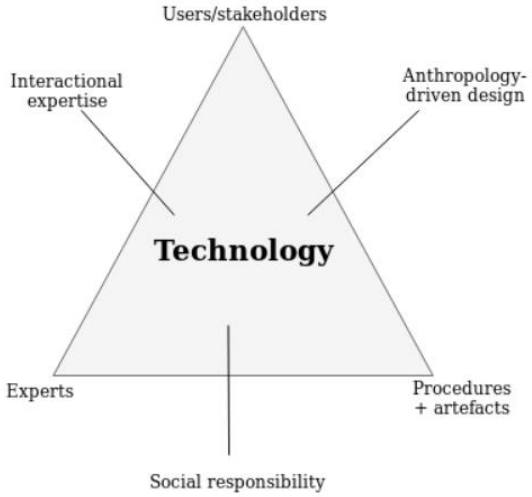

Illustration 2 - Techno-anthropological competencies (Børsen 2013)

The model has in its corners: Experts, User/Stakeholders, and Procedures + Artifacts. These three corners constitute the relevant components to examine and understand, and between them is how one should approach situations. For this project, the relevance of this model is in all three corners but only two of the sides: Interactional Expertise and Social Responsibility. Through methods aimed to understand a specific context, in this project ethnographic methods, we seek to understand experts, users, and their interaction with technology around them. Børsen writes about interactional expertise:

"*Techno-anthropological interpretation of perceived scientific and technological issues does not only address incommensurability between expert groups. It also deals with interpretation, dialogue and bridge-building between mismatching horizons of experts and users and other non-expert groups.*" (Ibid., p. 53)

For this project, our engagement in interactional expertise comes into play when we engage both students and educators, users, and the factual interviews with PBL and e-learning experts at AAU to provide a holistic understanding.

With our contextual knowledge and analysis, we also acknowledge that there is a social responsibility to help change the world for the betterment of humanity, in this case, AAU and its use of online learning. For this competency Børsen writes:

"*Social responsibility is especially relevant for techno-anthropologists [...] because they are able to research how technology affects humans as well as human culture and biology.*" (Ibid., p. 54)

Given the understanding we have, as presented above, a socio-technical understanding building upon a philosophy of technology, social anthropology, and ethics, we have the possibility and responsibility to make normative claims regarding the contexts that we study. For us, it is not enough, or even an option, to merely describe a case, we need to move beyond this and present possible changes to problems. This ties in with the last side of the model, Anthropology-Driven Design. While we in this project will not seek to engage in design changes, these could be either physical products, software, or procedures, we instead want to provide an understanding and make claims for what should be, and what is currently impeding to reach it. The natural next step for us to take would be a design change. Through, for instance, action research and/or participatory design, the conclusions and results of this project can and should be, used to make actual changes both for AAU but also other institutions, given further context understanding of how these institutions operate differently than AAU.

Throughout this chapter, we have presented the theoretical scaffold we have built for this project, upon which we seek to understand the world around us. Through a pragmatic understanding of experience and how the experiencers achieve learning through these, a post-phenomenological view of technology and mediation, and finally the competencies and ontological stance of Techno-Anthropology, we have intersubjectively created our data and analyzed it. In the next chapter, we add to our scaffold through our methodological choices of case, data gathering, and data analysis.

3 Methods

In this chapter, we will outline our methods used for this study. This involves the theory we based our case on, the methods used for data creation, how we analyzed our data, our epistemological considerations, and lastly how we ethically approached the research methods. The chapter will both present the methodological choices we made and based our work on, while also detailing how we carried out the work.

3.1 Case

For this project, the framing methodological approach is that of the case study. We conducted a single-case intrinsic study at Aalborg University during the spring and summer of 2020. This section serves to explain why this method was chosen, and what we aimed to gain from it. Creswell (2007) defines the case study as a study situated within a bounded context. For this project, it is the online learning activities during the COVID-19 lockdown at AAU that is the object of study. The location, period for study and research goals are all well defined and with an end, granting favorable conditions for a case study. The intrinsic case study is defined as a study on the case itself, seeking to maximize knowledge and understanding of this one case (Ibid.).

An approach for gaining a deep understanding of the context would be the ethnographic study. The methods used for this case study, relies on the ethnographic discipline, as also suggested by Creswell (Ibid.), which can involve interviews, observation, participant observation, artifacts, and documents. The methods and information sources for the case study are numerous; relevant sources of information will be involved and used in this study, though all qualitative in nature.

Bent Flyvbjerg (2006), a researcher working with the philosophy and methodology of the social sciences, has published the article *five misunderstandings about case-study research*. In this article, he highlights the history of the case study and its position and status as a scientific method. He argues for the scientific validity of using this method, especially as a qualitative tool, in contrast to earlier researchers within this field and their more quantitative focus. For Flyvbjerg the case study is a highly regarded method of doing research. He argues that the case study is not limited by looking at context-dependent knowledge, as for him all action involving humans will always be context-dependant (Flyvbjerg 2006). Following this logic, he outlines the two benefits for the researcher in doing case studies: "*... human behavior cannot be meaningfully understood as simply the rule-governed acts...*" (Ibid., p. 223) and "*Second, cases are important for researchers' own learning processes in developing the skills needed to do good research.*" (Ibid., p. 223). As such the method will allow context-dependent knowledge that can be useful going onward in the research to better structure online learning activities at AAU.

Following the notion of context-dependent knowledge, which is often seen as a critique of the case study, is that it is not possible to make generalizations from the knowledge it creates. Flyvbjerg refutes this as his second misunderstanding on case studies; he writes:

"*Misunderstanding 2: One cannot generalize on the basis of an individual case; therefore, the case study cannot contribute to scientific development.*" (Ibid., p. 221).

His rebuttal to this is that generalization is overrated as scientific criteria, but case studies can help to understand contexts, and supplement or provide alternatives to methods (Ibid.). For our work, we do not seek to generalize knowledge outside of our context. What we can contribute with is a thorough understanding of online learning activities at AAU during the lockdown of spring and summer 2020. A central determining factor represented in the case will be the lockdown and the implications it had. However, valuable insights and experiences will still be gained and can be used in the future which is independent of the lockdown context. Knowledge, insights, and findings might be extrapolated from our work to other educational institutions, but creating an *a priori* universal context-independent set of facts is not the goal with this project, and as such we deem the case study method relevant for answering the problem statement.

3.2 Data Gathering

This subchapter will detail our data gathering process. It will both be via a theoretical standpoint, what we root our choices in, but also a more concrete description of how we situated ourselves in the field and how the data was gathered. This project will have an ethnographic digital approach to the data collection. The two primary methods used were participant observation and the semi-structured interview. The data gathering process was conducted starting in late March and ending in late June.

Our methodological approach to this project is rooted in ethnography, and as such we have performed online participant observation in lectures and a single project exam, along with interviews of relevant stakeholders at AAU. Interviews are a part of the ethnographer's toolbox, where you as a researcher use yourself and engage informants to gain valuable knowledge about a culture. Hammersley & Atkinson argue that *"In fact, there is no sharp distinction even between ethnography and the study of individual life histories*" (Hammersley and Atkinson 2007, p. 1)

The Norwegian psychologist Steinar Kvale (2007), who has written several books and articles about interviews as a qualitative research method, interviewed the social anthropologist Jean Lave and asked whether a single anthropological method existed and in case of that, what the anthropological method entails, to this she replied, amongst other things:

"I think that the most general view is that the only instrument that is sufficiently complex to comprehend and learn about human existence is another human. And so what you use is your own life and your own experience in the world." (Kvale 2007, p. 48)

Following this ideal for this project to properly learn about other humans' experiences, the methods deployed must be, and are, intersubjective.

A central point throughout our data gathering process has been the digital aspect. Pink et al. (2016), defines digital ethnography and its strengths as:

"(...) *the consequences of the presence of digital media in shaping the techniques and processes through which we practice ethnography, and accounts for how the digital, methodological, practical and theoretical dimensions of ethnographic research are increasingly intertwined.*" (Ibid., p. 5)

Throughout the next two sections that present participant observation and interview, the digital aspect of the ethnographic work will be present as an object of discussion.

3.2.1 Participant Observation

As our initial data gathering method, we have conducted fieldwork using participant observation. In this section, we will outline our method, and why we have gone down this route. It will present traditional ethnographic methodologies for doing participant observation which we have followed to some degree, however, due to the circumstances of the lockdown all methods have been conducted online and as such have been altered from a traditional approach. This shift will take a central role in this section.

Through our data gathering process we have conducted the following fieldwork:

Subject	**Date**
Lecture	March 30th
Lecture	April 6th
Course Work Presentation	April 16th
Lecture	April 17th
Lecture	April 24th
Lecture	April 28th
Course Work Presentation	April 29th
Status Seminar	May 1st
Observation of a Focus Group Interview	May 1st
Pre-Exam Presentation	May 4th
Project Exam	June 23rd

The reason for performing participant observation was to experience first hand how synchronous lectures were performed at AAU. Being students at AAU, we have experienced lectures in both the traditional and online sense, for instance with lectures based in the Copenhagen Campus with participation from our program at the Aalborg Campus. We have however no experience how it is to be a student with lectures ongoing through a pandemic and nationwide lockdown. To achieve this experience or part of it, we needed to emerge ourselves in the setting where the activity was. We needed to participate.

Participant observation as a method serves to do more than allowing the researcher to co-experience a situation. We have through previous fieldwork found that participant observation can create rapport with informants, facilitate debate among researchers and informants and it can help the researcher to narrow or shift their focus of research. For us, it managed to do all of these things. We created rapport with informants through our fieldwork and obtained access to more people to interview, we were questioned, and participated in debates, about what online learning activities could or should be. Furthermore, it helped us, as we regard research as an iterative process, to both narrow our scope on specific areas of online learning activities and move away from areas we thought to be relevant for investigation but through participant observation presented themselves as not concerning our scope.

Methodologically, we approached our fieldwork as we would in any other ethnographic study with relevant methodological considerations, but with the digital aspect as a central element. We prepared subjects of interest for each day in the field, i.e. what to be especially observant of and what we wanted to learn. We individually wrote field notes from each day in the field and after each day we debriefed amongst ourselves what we have seen, learned, what surprised us or what did not meet our expectations, and what we wanted to focus on for the coming days.

For our field notes, we had two main methods we relied upon. During the fieldwork itself, we merely wrote jottings. Jottings are described by Bernard (2006) as quick notes you can take while actions are happening, they will serve as triggers later on when expanding and properly writing field notes. We would continuously during the fieldwork jot down our thoughts, experiences, etc. These would later be the base of more extensive field notes. When a fieldwork session was concluded we would meet online in our Discord server and debrief. Following this, each of us would revisit our field notes and continue to work on them. We all aimed to, as per Bernard (Ibid.) on field notes, make analytical, methodological, and descriptive field notes. Below is an example of all three types of field notes from our fieldwork:

Analytical notes from Lasse's fieldnotes:

"Camera has a huge effect on me, how focused I am Is determined by whether they got webcam enabled."

Methodological notes from Lasse's fieldnotes:

"I'm a bit frustrated about not participating in group work, since a lot of the lecture is taking place there, and I find it very hard to assess the state of PBL without having insight in what's happening in there."

Descriptive notes from Benjamin's fieldnotes:

"3 people in the group, 1 is MIA. They all have webcams on. After quick small banter, also related to me being there, they start working. Some talk about who should make a document, after a bit they all seem to get it working and start talking / debating the questions assigned."

A central point of discussion amongst our group in our data gathering was our degree of participation. At which point were we actual participators and when were we simply observers? Complete observation, that is the process of observing without interfering or being noticed, is impossible and not what we tried to achieve. The participation aspect is what allows the researcher to experience for themself the studied phenomenon. However, it is not a switch that is either on or off, it is a scale between full participation to no participation. Spradley (1980) has the following model for identifying the degree of involvement and type of participation:

DEGREE OF INVOLVEMENT	TYPE OF PARTICIPATION
High	Complete
	Active
	Moderate
Low	Passive
(No involvement)	Nonparticipation

Illustration 3 - Table of degree of participation (Spradley 1980)

With this model Spradley aims to outline the different types of participation a researcher can obtain in the field. It ranges from nonparticipation and no involvement to complete participation with a high degree of involvement.

Approaching research in fields that are constituted or mediated by digital media forces the researcher to consider how to approach it; it demands "(...) *development of new and innovative methods.*" (Pink et al. 2016, p. 2) and to challenge existing and traditional approaches, understandings, and analytical categories. For our fieldwork, it is not an easy task to precisely pinpoint where we have been located on Spradley's model. In some situations, we have been at the lowest end, nonparticipation, for instance investigating a Moodle room before a course, or studying a PowerPoint on our own. During the exam, we observed, our role was passive as to not be intrusive in a delicate situation. For most of our fieldwork with online lectures, we were predominantly passive, mostly speaking when directly spoken to. But even this passivity does not indicate a passive degree of participation, as Spradley (1980) himself deems that complete participation can only occur when researchers study situations that they could be ordinary participants in. We are students at AAU and while we did not have any lectures during the lockdown we had to receive supervision and perform project work online. Furthermore, we have in previous semesters attained courses that contained some elements of Flipped Classroom and followed lectures via videolink at the Copenhagen Campus while ourselves being located in Aalborg. Lastly, we are also students who have gone through 10 semesters at AAU and know for ourselves what a lecture can or should provide and result in. Due to these reasons, arguments can be made that even though we in a strict sense of the word were passive in our fieldwork, our type of participation was complete as we understood everything that was happening, we knew the tacit rules, etc.

Throughout our study, we have gained access by emailing educators at AAU asking for permission to participate in their synchronous online lectures. On top of this, we have asked them to inform the students hereof, and at the beginning of each lecture, we have informed the participants that we are currently observing the lecture. One area where we experienced problems gaining access and participation, was in lectures that had an element of group work. Since we all participated via online platforms, when students had to split into groups and work, it was hard for us to join. In one situation we had an informant in the class that we knew well and quickly messaged them and gained access to their Discord channel so we could continue participation during their group work, as described in the field note below from Benjamin:

"After 30 min, group discussion. Again, we need to act fast, find someone to join. I have a contact in the class and im quickly whispering him to try for access."

In other lectures where we did not have this type of access, we either tried to negotiate quickly with some students to join them or simply accepted that we were locked out of access for a small period and used this downtime to reflect and plan for the rest of the lecture.

Another issue we encountered when doing digital participant observation was how we represented ourselves. On platforms such as Microsoft Teams, it was not an issue since everybody was logged in via their AAU account and therefore identified and displayed as such. But we had several sessions of both fieldwork and interviews on Discord, where every user chose their own alias. Being users of Discord ourselves before the lockdown we had accounts already created with an alias, but an internal debate amongst us arose: Do we keep our normal alias that is not at all representative of our real names but fit into the culture of Discord, or do we change them to properly identify ourselves and our real names as researchers in the field? During one of our focus group interviews that were conducted on Discord, we changed our names from alias' to Benjamin, Lasse, and Svend. Shortly after some of the interviewees did the same and named themself their real-life names. Through our internal debates, we did not agree on an optimal solution, but we did always when needed change our names to our real-life names as the safer option. Informants and those we observe should always be aware of our presence.

Garcia et al. (2009) have through their review of *Ethnographic approaches to the internet and computer-mediated communication* found that many studies conducted ethnographically online have a degree of lurking. We as researchers have tried to avoid lurking while also being as unobtrusive as possible through the lectures. On top of informing the students at the beginning of the lecture of our presence, we wrote a short message in the chat about our physical presence, so that students who joined the lecture late would be informed hereof.

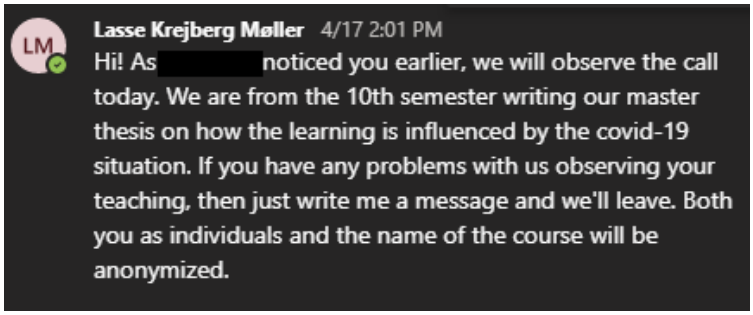

Illustration 4 - Screenshot of information to students on Microsoft Teams

Garcia et al. (Ibid.) points out that gaining access to an online setting and research object is different than for physical ethnographic participation because of the "*lack of physical presence*" (Ibid., p. 53) and stress that the ethnographers have to learn to:

" (...) *manage their identity and presentation of self in visual and textual media and how to do impression management via computer mediated communication modalities such as e-mail, chat, and instant messaging.*" (Ibid., p. 53).

3.2.2 Interview

Along with participant observation, interviewing is one of the two main methods used for data gathering in this project. Using interviews combined with participant observation made it possible for us to ask follow-up questions about specific observations or experiences throughout the fieldwork. Furthermore, interviewing is a method used to gain an understanding of certain elements within the field.

Throughout the project, a total of 12 interviews have been conducted with different aims and focus'. We have done individual interviews, focus group interviews, and two factual interviews. See below for a short presentation of the interviews conducted.

- Focus group interview with 5 students regarding group work and their experiences.
- Focus group interviews primarily centered around a specific course and the experience hereof.
- An interview with an educator at the same course as above focusing on the learning journey and experiences.
- Interview with Thomas Ryberg, AAU researcher focusing on e-learning and PBL.
- Interview with Rune Hagel Skaarup, employee at CDUL (Center for Digital Understøttet Læring / Center for Digitally Supported Learning).
- Four Interviews with students regarding their experiences of the online learning activities and group work at AAU.
- Interview with an educator regarding online exams.
- Two Interviews with educators regarding their experiences of teaching online.

All interviews were conducted synchronously digitally through the internet, due to the COVID-19 situation. One of the strengths of the online interview is that it does not require the researcher and interviewee to travel for a face-to-face interview and hence can be an economic and time advantage (Deakin and Wakefield 2014). This permits the researcher to perform more interviews as well as interviews with international subjects which might not have been possible to conduct as traditional onsite interviews within their setting (Lo Iacono, Symonds, and Brown 2016). It is important to stress the fact that our interviews are digitally mediated since it shapes various aspects of the interview. A comparison of skype-interviews with in-person (or onsite) interviews within a study of irritable bowel syndrome concluded that the participants of the onsite interviews "*said more, although this was on a similar range of topics*" (Krouwel, Jolly, and Greenfield 2019). Building rapport with informants is always a challenge as a researcher, but does the medium and space where the interview is conducted affect the rapport? Deakin and Wakefield (2014) concluded that:

"Skype interviewees were more responsive and rapport was built quicker than in a number of face-to-face interviews. Online rapport is […] *only an issue when interviewing an individual who is more reserved or less responsive* (Ibid., p. 610)

Likewise, the technical aspects affect interviews. Seitz (2015) found that technical issues might create a loss of intimacy if the technology failed during an emotional conversation. Hall, Frederick, and Johns (James and Busher 2012) have made several (net)etiquette suggestions, based on their research with newsgroups, for example, that the self-identification and self-representation of the researcher are critical and an understanding of the specific group culture should be attained before the interview. Our interviews and online participation has been done through mediums we use ourselves as students and the culture of the students is familiar to us. James and Busher (Ibid.) conclude that:

"*The effectiveness of online research interviews of all sorts depends on who is being researched, what is being researched, and why.*" (Ibid., p. 188)

One of the strengths of these interviews is that we were observing and investigating a practice happening solely online, and conducting these interviews online only seems fitting and relevant.

Our phenomenological approach to the study permeates our methodological application of the craft of interviewing, therefore our interviews have aimed to explore the individual's experiences. We want to explore the experiences in online education to gain knowledge about how these interrelate and how the

individuals perceive and experience the shift towards an exclusive online education happening at AAU during the COVID-19 pandemic.

Besides having these individual interviews with students and educators at AAU about their experiences with online education, we conducted two focus group interviews. A benefit we have experienced in previous research using this method is that it facilitates debate and discussions about the topics amongst the participants, which might lead to new insights. A weakness is that traditionally focus group interviews have a tendency wherein we as researchers are not as able to investigate the lifeworld of the participants and relate their experiences to this as in one-to-one interviews.

On top of the phenomenological individual interviews and focus group interviews, factual interviews with relevant experts within AAU were conducted to uncover valid factual information (Kvale 2007). These interviews were not merely focused on the experiences and perspectives of the interviewees but were held to gain an overview of how stakeholders within AAU reacted to the current crisis.

Our phenomenological interviews, factual interviews with stakeholders, and focus group interviews were all conducted as semi-structured interviews. In these, a prewritten interview guide was prepared with questions aimed to explore the field of knowledge, which we were interested in investigating. Semi-structured interviews have some of the same qualities as the unstructured interview, for instance, the ability to pursue new interesting leads during the interview (Bernard 2006). Likewise, it also has some of the qualities from structured interviews, where the researcher follows the interview guide and ensures that all questions are answered during the interview (Ibid.). Furthermore, using the interview guide ensured that we got "*reliable, comparable qualitative data.*'' (Ibid. 212)

3.2.3 Epistemological Frame

Epistemologically, interviewing can be regarded as a method where knowledge is *created* between the interviewer and interviewee; it is knowledge gained through dialogue (from Latin logos: talk, dia: goes back and forth) (Kvale 2007, p. 3). Interviews are knowledge created in an *inter-view* between the interviewer and interviewee. Furthermore, Interviews can epistemologically be regarded as a method to explore and gain knowledge existing in the world out there ready to be collected. Kvale refers to the latter with a metaphor of a miner, merely mining knowledge (Ibid.). We rely mostly on the first presented epistemological understanding of interviews, the same understanding is present concerning our participant observation. The knowledge is produced interpersonally and the knowledge is situated; it is not context-independent.

"The concept of reflexivity acknowledges that the orientations of researchers will be shaped by their socio-historical locations, including the values and interests that these locations confer upon them. What this represents is a rejection of the idea that social research is, or can be, carried out in some autonomous realm that is insulated from the wider society and from the biography of the researcher, in such a way that its findings can be unaffected by social processes and personal characteristics." (Hammersley and Atkinson 2007, p. 15)

Our data are highly shaped by both the context and us as researchers affecting the interviews with values, interests, gender, age, etc. Because of this, it is important for us as researchers to be reflexive about our own position and effect on the knowledge created through this interaction, as well as describe, analyze and reflect upon the context of data generation, for example how the format of online interviews in opposition to the traditional face-to-face interviews shapes the knowledge produced.

We regard our data as being constructed through and by interaction with the actors in the field, both in the participant observations and in the interviews, however regarding data as something generated intersubjectively does not mean that we cannot find or explore traces of social phenomenons (Ibid.). This ontological and epistemological understanding of knowledge and data generation is based upon a break with both positivist and naturalist traditions. The positivist tradition regards knowledge and science as something "*open to, and are actually subjected to, test: that they can be confirmed, or at least falsified, with certainty*" (Ibid., p. 6). Implicitly, this means that the researcher must gain control over all contextual variables and try to exclude them from their research. The ethnographic naturalist tradition entails that the ethnographer studies the social world of inquiry in a natural state and suggests that the ethnographer should try to be as unobtrusive as possible. In addition, naturalists regard "(...) *social phenomena as quite distinct in character from physical phenomena*''(Ibid., p. 7). Both understandings of the world and how to conduct valid science we regard as invalid, as they both fail to address the inevitable effect the researcher has on the research, either directly when data is co-produced or in the political aspect of the research. They both seem to utilize, what the feminist STS scholar Donna Haraway would refer to as the "god trick" (Haraway 1988). They lack the significance of the perspective from where the research is conducted; research is always conducted from a point of view, where the researcher(s) come with history, values, bodies, interests, etc. (Ibid.). The separation of social and physical phenomena would be another point of critique from STS scholars, as Haraway, who would argue that such separation and dichotomy is a simplification and that phenomenons, both physical and social, are inseparable, and continuously constitute and reconstitute each other. Our goal is not to achieve value and theory-neutral, transcendent, universal knowledge, nor do we not find this possible. We rather seek to create context-dependent, situated, value-laden, knowledge that will act as a foundation for actions and changes for the institution, AAU.

3.3 Data Analysis

In this subchapter, we will outline how we coded and analyzed our data. It will consist of two parts: a theoretical approach based on Braun & Clarke (2006) and a coding process done in NVivo, a software that presents itself as "(...) *a place to organize, store and analyze your data.*" (NVivo 2020). The purpose of this section is both to provide an understanding of the choices we made, why we made them and how they affected our results, and provide an overview of the actual practical work we did in our coding process.

3.3.1 Thematic Analysis

"*Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data."* (Braun and Clarke 2006, p. 79).

Thus begins the chapter in Braun & Clarke's (Ibid.) article on thematic analysis concerning what a thematic analysis is. It is a method for processing a dataset and through a well defined and structured process ends up with a set of themes that accurately portrays the data. Through this process, several choices can be made depending on what the analyst seeks to show, how they approach it, and their ontological and epistemological standpoint. Throughout this section, we also want to highlight our own role as researchers in the process, and as Braun & Clarke (Ibid.) argues, themes do not emerge on their own in the process of analyzing or coding. Themes, and codes, are made by the researchers based on actions taken and experiences

achieved throughout the process. We began the reflection on themes in the preliminary phase of the project, discussing how to frame it. When we designed our interview guides we reflected upon them and during fieldwork and interviews, they helped to guide our actions. These reflections were happening both individually and through discussions in the group and were directed at what we learned, how we should frame questions, or which questions should be more central in future interviews. This ongoing reflection resulted in a structured final discussion when it was time to code our data; each group member agreed with each other what our data consisted of, what it entailed, and how we should use it. In the following, a presentation of the choices Braun & Clarke suggest for their method will be made, following what choices we made and why.

A rich description of the data set, or a detailed account of one particular aspect (Ibid. p. 83). This first choice relates to how one wishes to use the data. Is it to accurately portray the entire data set or to highlight specific instances? If we had selected the first approach, a rich description of the entire data set, it would mean that all themes should be present throughout the data. No theme should exist if it is not present in all of the data sources. We pursued the second option in this choice and found specific areas we wanted to convey. This was both due to the large amount of data we had and the diversity of it. The factual interviews were vastly different than some of the student interviews or the field notes we created. Another reason we did not attempt to portray the entire data set in a rich description was that we had a specific goal in mind; problems we wanted to explore and address. This choice was in part, a result of the ongoing reflections we had made throughout the fieldwork and when coding we neither were nor wanted to be a tabula rasa, this argument also closely relates to the next choice we had to make.

Inductive versus theoretical thematic analysis (Ibid. p. 83). This choice forces the researcher to be aware of the direction they want to pursue in the analysis. Is it to freely present the data and show what has transpired, or have they, as we did, a theory or specific research topic at hand when coding? In inductive coding processes, the researcher allows the data to speak and tries to simply depict through the themes what occurred. As presented in our introduction, with this project there is a clear purpose which we wanted to pursue, and therefore we decided to do a theoretical thematic analysis. Our problem statement and two research questions were an overarching frameset together with our theoretical approaches of pragmatism and post-phenomenology. As such we have several codes related to experience, a key term within both theories, and technological mediation. Choosing the theoretical thematic analysis was not a clear cutoff from being inductive. In some aspects, we approached our data inductively and tried to let the data show what it entailed, and through that code it. However, these codes were either made concerning the theory or were discarded later on if we discovered it was of less importance. Thus, the theoretic mindset we had guided our choices but with an open mind to new findings in the data.

Semantic or latent themes (Ibid. p. 84). Should the thematic analysis center on literal statements from informants or analyze the meanings of them? This is the central point in this choice. In a semantic approach, the researcher will merely reproduce statements explicitly. In a latent analysis, meanings beyond the words spoken are sought. Following our structure with two different research questions and their scope, our coding process was at times a mix between semantic and latent. In some areas, we did only want to portray what happened or what the informants experienced. As a result of our amount of data and the scope of this project, we found our mixed approach to be relevant and not limit ourselves to one or the other.

Essentialist/realist versus constructionist thematic analysis (Ibid. p. 85) The last choice is, according to Braun & Clarke, an epistemological one. To this point, however, we disagree with them in the sense that only this choice is an epistemological one; in our understanding, every choice made so far in the coding process has been an epistemological choice. How is knowledge produced, understood, or created? In our work, we had

a constructivist approach, both to our thematic analysis, but also in all our work. This is also presented more in detail in our previous chapter, and as such will not be in-depth explored here. Instead, we will simply leave it with, what Braun & Clarke describes the constructionist approach is, that experiences and meaning are socially produced.

3.3.2 NVivo

As presented earlier we used the software NVivo for our coding. NVivo helped to organize and create an overview of our data and codes during the process. Following our epistemological understanding that technology will co-shape actions through mediation, we will in this section present our coding process through NVivo, to provide an understanding both of how we did it but also how NVivo shaped our choices.

Initially, we did a round of coding with three interviews where we were only added codes; if any group member felt a code should be added it was created. This process resulted in around 20 codes being made. After this initial round, we discussed the codes. Did they have the right name? What did we mean with the code? Should some codes be merged or split into different codes? These were the central questions we were dealing with in this discussion. One result of this discussion was that each code that survived the process had a fixed description written into it in NVivo. This allowed a common understanding within the group of the range for each code, what it should and should not be used for.

After this initial round, we began coding the rest of our data. As with everything else we have done throughout the project, this was an iterative process. Debates were continuously held regarding what code should be used, what new codes should be named, and what their description was, how we interpreted statements, etc. For us, the usefulness of thematic analysis is both the result, the themes themselves, created from it - but also how it facilitated discussions and reflections throughout the entire process and created a deeper understanding of the data. This was beneficial for our project, having to code and decide on meanings for codes facilitated debates and resulted in both new knowledge being created internally, but also clarify what we wanted to say with our data and formulate what actual end goal we had in mind for our project.

After all data were coded we went through a new round of discussion of the meanings of each code. Ideas or understandings we had at the start of the coding process were for the most part changed throughout. As such, we had to update almost all of their descriptions to accurately represent what the code had been used for. Furthermore, we went into deeper detail with both our most and least used codes. For the least used ones, we either let them be as they were, agreeing that it only appeared these few times and that it was to be its own code. Others of the least used ones we merged into other codes, as they better fit within their overall descriptions. For our most used codes, in some instances, we un-coded data, due to the updated description, or we added sub-codes to them. The ones that had sub-codes attached were codes that were too large on their own and therefore did not suffice in accurately portraying meaning in places of use. An example of this can be seen below in illustration 5, for the code *Software*.

Name	Files	References
Software	13	46
Non-Authorized Software	7	13
Software - Limitations	7	11
Software - Possibilities	7	14

Illustration 5 - The software node in NVivo

The last step was to create themes from our codes. Through first individual and then group brainstorming and the use of NVivo's mapping function, we did several rounds of generating themes until we reached a point where we felt the themes both reflected our goals for the research and could answer our research questions, and that the themes accurately reflected our data and the codes we had made. This map can be seen below in illustration 6:

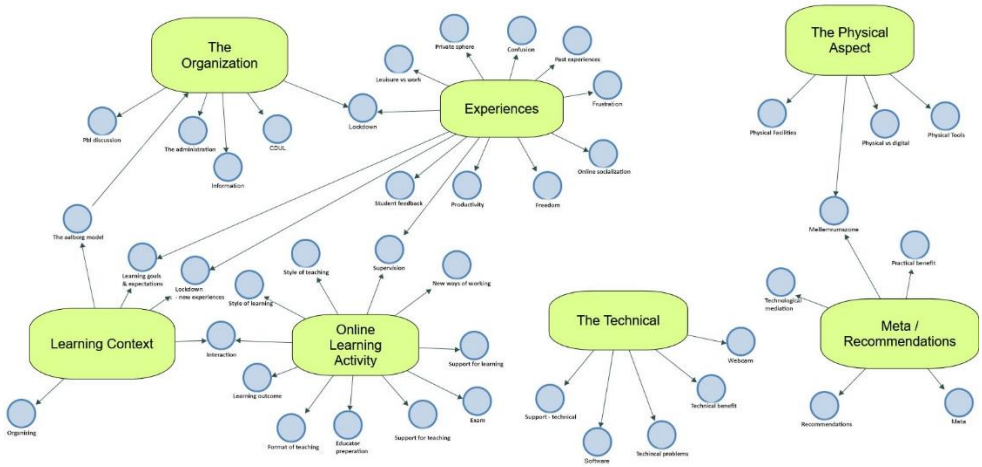

Illustration 6 - Theme map in NVivo

To sum up, we have used the thematic analysis by Braun & Clarke with NVivo as a tool and adapted it, so it could guide us through our empirical data and provide us with an overview. The analysis will not be a complete presentation of each code and theme in chronological order, instead, we will bring up relevant themes related to our research questions where we find it adequate for answering the problem statement for this project.

3.4 Research Ethics

In this last subchapter, we will present how we have sought to carry out our research in an ethical manner, especially in regards to our informants and their privacy. This will cover informed consent, working online, and anonymity.

In preparation for our fieldwork and interviews, we prepared a document to reach informed consent with our informants. This document is attached as Appendix B. In this document, we detailed what we were doing, why we were doing it, how the interaction would be recorded, the rights of the informants, and lastly how we would handle anonymity. We wanted to ensure every informant understood what they were participating in and what rights they had as informants. This letter of informed consent did in most aspects not deviate from how we typically would design it, only for how we obtained the consent with informants was atypical. Normally we would bring physical copies to informants, provide them with their own copy, and have them sign another. Since every aspect of the fieldwork was carried out online obtaining signatures from informants would have been a troublesome process. Instead, also described in the document, consent was done either via email, or we reached it verbally at the beginning of the fieldwork with each informant. For instance, each interview would start with us asking if they had read the document, understood their rights, and if they consented to it. For fieldwork in synchronized lectures, the situation was a bit different however, as some lectures had more than 30 participants. For lectures, we ensured agreement with any educators that would

facilitate the session and made them reach out to their students before the lecture. Furthermore, each lecture we participated in, the lecturer would either verbally remind the students or write a message in the chat for all to read. Often we would be asked to present ourselves, which we did, and give a small speech based on our letter of informed consent. All of this was done to ensure all the data we created with informants were created from informants that willingly participated and understood what they participated in.

However, despite all our efforts, we cannot be fully certain we reached 100 % informed consent in the lectures where we did participant observation. Below is an outtake from our field notes:

"After 10 minutes a student asks to have 2 people invited, they are not in the Teams group. It is quickly fixed by the lecturer with help from the student. 1 minute and the lecture can continue." (Benjamin fieldnotes)

"About 20 people are in the Teams meeting when we join. It slowly rises to about 25." (Benjamin fieldnotes)

As described in the field notes, the number of participants in lectures, as could be followed precisely via a number shown in the software, were always changing. A common pattern was that from the morning it would slowly rise, and towards the end of the lecture, it would slowly decline. As such, some students or educators would miss the initial message if they joined late. For the lectures where we had a detailed message in the chat, or if an email was sent out to participants before the lecture, there was a chance to reach these late-joiners. But we cannot be certain that they read and understood it. We assessed that verbally announcing our presence and purpose each time a new person joined would be overly intrusive to the flow of the lecture. To ensure that no person was unfairly portrayed or represented in our project, any information or quotes used from our field notes have been scrubbed of any reference to who they might be. We assess that through this method, the only people that are quoted directly or portrayed in this project are people that have agreed to it and have understood what they participated in.

Lastly, we will describe how we have handled anonymity for this project. Early on in our research, we decided to anonymize any informants beyond our two factual interviews, since for those interviews with whom they are provided significant context to their statements and both informants agreed to it. There is no clear answer to whether to anonymize or not in qualitative research. And as Saunders, Kitzinger, and Kiztinger point out, it is also a question of " (...) *two competing priorities: maximising protection of participants' identities and maintaining the value and integrity of the data.*" (Saunders, Kitzinger, and Kitzinger 2015). In their article on the processes of anonymization, they have the debate not only how to anonymize, but if the researchers should. While contextual knowledge and power structures can be hidden in the act of anonymization, the safety of informants and their wishes should rank higher.

We verbally emphasized with informants how they would be represented. We would only identify them by gender, study program, and a pseudonym. This was done to help them speak freely without fear of consequences, as we assess this project to possibly be read by people at AAU, and as such being recognized for critical statements could be a problem for some of our informants. We wanted them to feel safe in speaking their mind and if they wanted to criticize choices made by AAU during the lockdown. This anonymity for some of our informants has been very important for them, and as such, we followed our own guidelines strictly throughout our work. In addition to this, it has been important for us as researchers to conduct a study, which will be constructive and forward-looking; it has been done to find possibilities for digital education at AAU and understand the inherent boundaries of it. The project should not be used as a means of placing liability for problematic aspects of digitizing education at AAU during the lockdown.

Normally we would attach the transcriptions of the interviews and our field notes as appendices to the project report to ensure transparency for the readers of the project, but due to possible identifiable statements or data, we have left it out.

4 Introduction to the Analysis

Before we dig into the analysis, first a short introduction to how the formatting will be. Since the analysis consists of three chapters, covering two research questions and represents about half of the text in the report, it is necessary for the reader to obtain this understanding.

As mentioned the analysis will consist of three chapters. The first two chapters cover the two research questions, while the third uses the information provided in the first two to analyze how PBL has been executed at Aalborg University during the lockdown while seeking to answer the problem statement.

The first chapter covers the Aalborg Model and the various PBL departments of AAU. It also provides a timeline of information regarding how the lockdown occurred at AAU, and how the flow of information has been during this time.

The second chapter analyzes the experiences of educators and students during the lockdown and moves to a more theoretical aspect of the analysis as it takes these experiences and tries to understand them concerning Dewey's theory of inquiry and post-phenomenology.

In the last chapter, we summarize our findings. What have the effects been for PBL and the Aalborg Model during the spring and summer of 2020? This is based on the findings presented in the first two chapters. Closing this chapter, we outline our recommendations for future iterations of online learning activities and in which areas we assess further research is needed.

5 AAU and the Aalborg Model

In this first chapter of the analysis, we answer the first research question which states:

What classifies Problem-Based Learning at Aalborg University, which departments support the facilitation of online learning activities, and how have their efforts manifested itself during the lockdown?

To answer this research question this chapter will first outline Aalborg University's philosophy of learning, the Aalborg Model, which entails their version and application of PBL. This section will also point to some of the departments within AAU that support the development and implementation of PBL and online learning. Following that, we will focus on the timeline of the lockdown at AAU, how the university responded to it, and how the flow of information to students and educators were executed.

5.1 The Aalborg Model

At AAU, Problem-Based Learning (PBL) is a model used for education and research. PBL is, in their words, a pedagogical approach that permeates every decision made, how education and research are conducted, while serving as a framework followed by everybody (Aalborg University 2015). This section will outline what PBL is, how it is adapted at AAU, and why it is important to understand AAU's use of PBL for us to answer the problem statement.

PBL at its core is a learning approach that puts problems in the foreground instead of simply teaching a subject. Learning how to approach, define, analyze, and solve problems and then reflect on the knowledge gained is some of the benefits of PBL. Below are some of the core principles of PBL as outlined by Savery (2006). Note the use of the term tutor in both Savery and our presentation of the Aalborg Model. This term is related to PBL, but will merely be used in this section.

Collaboration. To prepare for the job market after their education, students are placed into situations where collaboration is required. PBL requires students to learn how to share information and work with other people. At AAU, the group-format permeates the education structure, both with group projects each semester, but also in courses that tend to use different formats of group work.

Interdisciplinarity. Real-world problems often do not reside within a single discipline, they span across several and will require various actors to collaborate to solve them. Therefore, an interdisciplinary approach must be taken in PBL for students to learn how to utilize several disciplines and think outside their field.

Responsibility for own learning/help define the problem. Students must engage with problems on a level that matches their current knowledge, and from there define the problem. While they do so under the guidance of a tutor, they are responsible for defining what they want to learn, and how to get there.

Reflection on learning/Self and peer assessment. Students must at all times reflect upon what they are doing, and what they are learning. To support this process, assessment should be performed from peers, tutors, or themselves. These reflections will help the student define and work with future problems in understanding what does and does not work in the given context.

Examination in relation to learning goals. The final core principle to be outlined here is the examination. Learning goals must be defined and presented for the student before engaging in a PBL project, and these

are what they are examined in. Being able to define and present what you have learned and worked with during an oral examination helps to solidify the learning outcome, achieved through PBL, in students.

While these principles make up the core of PBL, it is also important to note that PBL is not one single thing. It is a system that can be utilized, but its implementation and use will differ for various institutions. So while we above have outlined some of the core principles for PBL, that does not equate that each institution that subscribes to PBL will embrace them all. Likewise, at AAU, they have their own approach to PBL, which will be outlined below. In the core principles above, some examples have been shown as to how AAU approaches these principles, those presented below are the ones specific to the Aalborg Model, where AAU moves beyond what Savery attributes as the core principles of PBL.

5.1.1 Problem-Based Learning at Aalborg University

AAU follows what they describe as the Aalborg Model; the university's own adaptation of PBL. Besides the generic PBL principles described above, AAU has other core principles for how they work with PBL. This is based upon a publication from AAU detailing the Aalborg Model (Aalborg University 2015).

Courses supporting the PBL approach. At AAU the structure of a typical semester is 30 ECTS, where half of these are a semester project performed in groups by the students, and the other half courses. Each semester will have a theme that is reflected in the semester project, and the courses must help to support these by providing the students with methods, theories, experiences, cases, etc., for how to engage and answer the learning goals defined in their semester project. In some semesters or programs, this structure can vary, but this is the typical setup.

Theory and Practice. For AAU, PBL revolves around the students learning how to bridge theory and practice. Working with real-life problems helps to ensure practice, along with the next core principle, and the support from the courses provides the theoretical framework for handling these problems. This ensures both an academic approach, but also that the students learn how to solve actual problems outside academia.

Collaboration with external partners. Students are encouraged to collaborate with external partners during their project work. This collaboration helps to create the aforementioned bridge between theory and practice and gives experiences to the students into what problems their discipline can engage and solve. At AAU, tutors are experienced in providing the students with contacts and keep an updated list of potential external partners and projects they seek students for, which is essential for the different departments.

A central framework for understanding PBL at AAU and the Aalborg Model is the *study activity model*:

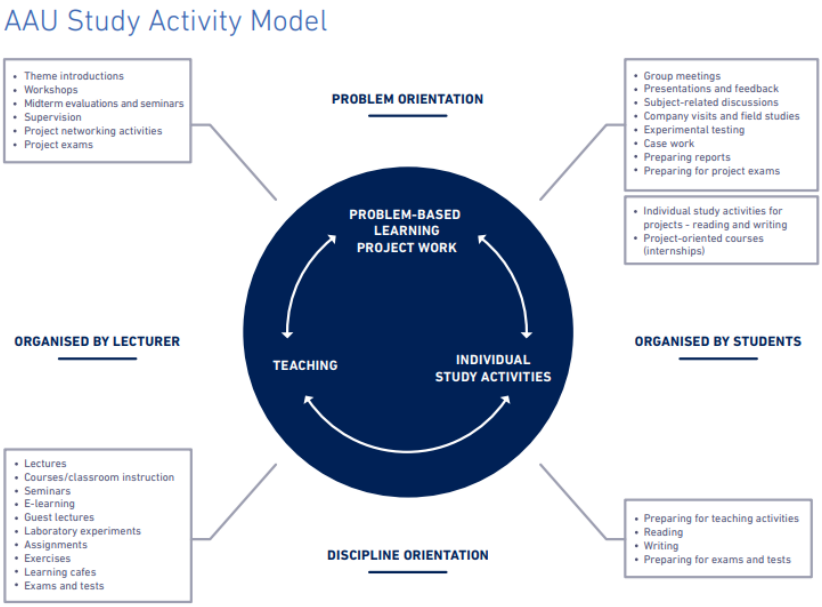

Illustration 7 - Study Activity Model (Appendix C)

The model consists of two axes, student-organized activities/educator organized activities and problem orientation/discipline orientation. In addition to providing an understanding of the types of learning activities and how they depend on each other at AAU, an Excel tool exists based on the model to ensure that the students work the amount required to be considered a full-time student. This tool is a way to operationalize the goals of the model. While we will include the model and the overall goals of the Aalborg Model later on in the analysis to explore how PBL has functioned during the lockdown, we will not delve deeper into the Excel tool.

5.1.2 CDUL and PBL Departments

How AAU works with online PBL is presented in their Digitalization Strategy (Aalborg University 2018), which is a part of the overall strategy for AAU *Knowledge for the world 2016-2021* . In the strategy, it is stated that:

Illustration 8 - Knowledge for the world (Aalborg University 2018)

One of the initiatives in the strategy to fulfill their digitalization goals states that they will establish a:

"(...) *cross-organisational knowledge centre for digital learning. The knowledge centre will both contribute to the continuous development of digital learning methods, especially PBL learning methods, and provide support to teaching staff and supervisors in their implementation of these learning methods. The knowledge centre will provide technical and pedagogical/didactic guidance.*" (Ibid., p. 15)

The centre for digital learning became a reality as a new department in 2018 called Center for Digitalt Understøttet Læring (Centre for Digitally Supported Learning, CDUL). CDUL is the responsible department for developing new strategies and approaches for how to incorporate PBL into the digital sphere. They work closely with the various PBL groups at AAU, for instance, PBL Academy who supports the use and development of PBL across AAU, and the PBL research teams at various faculties. Furthermore, CDUL has employees at each faculty to ensure context-dependent knowledge and understanding of how each faculty deploys and uses PBL for their context. CDUL has a focus on the didactic and pedagogical side of incorporating PBL into the digital sphere, and while they often experience educators approaching them with technical problems, they will aim to introduce didactic and pedagogical considerations as well, as described in the quote below from the interview with CDUL employee Rune Hagel Skaarup:

"*It always starts with, or often, it is a technical problem and not so much a pedagogical one. And we* [CDUL] *really want to talk about the pedagogical aspect, so our approach has been that we engage that side first and figure out what they want.*"

While IT Support (ITS) is the department for the technical aspect, providing hardware, troubleshooting, and support, CDUL manages the didactic aspect of digital PBL, and as such, they are responsible for educating the educators. This is for instance done through one-to-one support, workshops, or theme-days at the different departments.

With CDUL established, they are in a position to provide the needed support to ensure parts of AAU's digitalization strategy, which also states that:

"*AAU will establish and maintain the best possible framework conditions for the digital support of PBL. This will focus on the digital learning environment of AAU's students and on developing strong teaching skills within digital learning*." (Ibid., p. 14)

These are lofty goals and to achieve it will be no easy task. Furthermore, AAU in their digitalization strategy promises that:

"(...) *lecturers, supervisors and students will receive the support required for applying digital resources in teaching activities, project work and as part of the learning environment.*". (Ibid., p. 15)

So AAU promises the best possible framework conditions for digital PBL, and that everybody will receive the support they require to execute it. These goals, operationalized through departments such as CDUL, promise the world, but do AAU deliver? The lockdown context will of course make it harder for them to do so, but to properly assess any initiative implemented regarding digital PBL, these are the goals and promises that AAU can and should be judged in regards to.

5.2 Lockdown at Aalborg University

After several months of rising cases of COVID-19, the Danish government issued multiple initiatives in an attempt to curb the transmission of the virus. One of the initiatives was that all students were sent home from their educational institutions to prevent physical contact. In the following, we will describe how AAU reacted to this situation and how AAU, as an institution, created the setting for the online learning activities that were to take place in the following months. The description of the actions taken will be grounded in emails sent out by several actors at AAU, information at AAU's website, along with interviews with educators, students, an employee at CDUL, and a researcher working with online learning and PBL. The detailed explanation below is constructed for the reader to get an understanding of the flow of information from the university to its students. A flow that for some was regarded as spam or insufficient in meeting the requirements they had during the lockdown.

The first email mentioning COVID-19 was from the Rector Per Michael the 2nd of March stating that the university monitored the current situation closely and that a plan for bringing exchange students home had been made. On the 11th of March, an email was sent out by the chairman of the Corona task force at AAU outlining that bigger seminars and events, which did not serve a critical function within the research or consultant area, would be canceled. Furthermore, all travels abroad were prohibited.

On the evening of the 11th March, the Danish prime minister Mette Frederiksen held a press conference, where she presented what initiatives the government had taken to decrease the basic reproduction rate of COVID-19. This included that all students at educational institutions were sent home for two weeks from the following Monday. In the wake of the press conference, an email was sent out to all students and staff the same evening ordering all students to stay home for at least two weeks. All employees were to meet the following day to receive instructions on how to work from home. The following day an email was sent out to all students at the Department of Planning by the head of studies at the department, informing the students how teaching, supervision, and group work should be conducted in the upcoming weeks. Lectures were moved online and to be held asynchronous, due to a recommendation by ITS as explained to us within an interview with Rune:

" *But ITS as an organization, support unit, won't go out and say "Use this platform" until they are 100% certain* […] *and that means that they need to have tested it rigorously*".

On the 24th of March, an email was sent out by the AAU corona Task Force informing students that the "*... Measures to limit the spread of coronavirus have been extended to 13th of April.*", and because of this, the university would remain physically closed until that date. The 26th of March an email was sent out to all students enrolled in a program at the Department of Planning by the various chairmen of the study boards of the programs, to:

"... Thank you for your collaboration on the switch to digital teaching due to the lock-down of the university Thursday March 12. It is our impression that all teachers are really making an effort and doing a great job teaching on a distance."

This email also stated that any issues related to online teaching should be reported to the program coordinator at the given program. It is furthermore, the first mention of the possibility of online exams in June, in case of a prolonged lockdown.

On the 14th of April, the rector of AAU sent an email informing the students that online teaching would continue for the rest of the semester and that all exams would be conducted online, due to an extension of the lockdown to the 10th of May.

"*This means that the rest of the semester will be conducted online for all students, even if Aalborg University may gradually open after May 10th.*"

In the wake of this information the Department of Planning, represented by the head of studies and the chairmen of the study boards, sent out on the 24th of April an email informing students how the exams would be conducted. Besides the practical information and regulations on the exams, they sent out a disclaimer that could be attached to their project reports. This disclaimer reads:

Disclaimer from Head of Studies and Head of Study Boards

COVID19 and the consequences of the lock-down of society and the university since March 13, 2020 have had influence on which activities that have been possible to stage and carry out as part of the project work. More specifically, this means that activities have been limited to online activities, and that activities such as Lab activities; surveying activities; on-site ethnographic studies and on-site involvement activities have not been possible.
When assessing this project, please bear this in mind.

Added here: the students own reflections on the challenges they have experienced and how they have sought to overcome these.

Illustration 9 - Disclaimer regarding the COVID-19 situation

The 25th of May an email regarding the execution of the expanded phase 2 was sent out by rector Per Michael informing the students that it would now be possible:

"*... to hold physical oral exams for Master's theses, Bachelor's projects and Professional Master's final projects. This is the consequence of the expanded phase 2 reopening of Danish society.*"

The information sent out to students enrolled in a program related to the Department of Planning at AAU is selectively chosen by us and only contains what we regard to be the central points. The total amount of

emails sent out to students enrolled in Techno-Anthropology at AAU is 18 emails sent out by *coronavirus@aau.dk*, 8 emails which were sent out on behalf of the head of studies at the Department of Planning, and a handful of emails sent out by the study secretary for Techno-Anthropology with technical details and regulations about the exams. It is likely, however not visible for us, that semester coordinators on different semesters, sent out emails informing students about their exams and plans for online teaching as well.

5.3 Flow of Information

How does the information provided by the administration affect the students and educators at AAU, how do they experience it, and how does the information shape the experiences of the stakeholders at AAU? We answer these questions in the following subchapter, based on our interviews and observations.

The frequency and amount of information matter to the involved actors, this is seen in several of our interviews. As one of our interviewees, Sara says in an interview "*I feel like I'm drowning a bit in emails*". Kasper another interviewee supports this and states:

"*(…) I get all the* [emails] *twice. I get them in Danish and then I get them in English. And then I receive the information which concerns all of AAU, then the specific faculty and the information for my own program.*"

Similar is stated by the student Hans who says:

"*There was so much information that was sent out to us in the beginning. Every single thing that the university released was sent to us by 5 different people, so we would get 5 different emails from different people telling us the same thing.*"

The amount of emails coming from the university affects the students' inclination to read these emails, the informant Stig comments on this in an interview:

"*I think the university sent out a lot of emails, but as you know a wall of text in an email is not useful. I think the university tried, but they didn't really try. Sending out emails is not a lot of work.* [...] *Most people don't read those, at least I don't I just skip them completely.*"

Another student Jens says that:

"It's not "razor-sharp" all of it. So I just read most of the emails vaguely […] *but some of them I read fully".*

The student Brian even refers to the vast amount of emails as spam. The educator Finn supports this and says:

"Let us put it this way. I have received more information than usual, but it doesn't mean that it is relevant."

When reading the statements above presented by the students and the educator, it is relevant to reflect upon how the university could have provided the information better. As the student, Sara states:

"It has been a huge mistake sending us so many irrelevant emails because it makes me overlook the important ones."

She continues this point and says that the university should have considered if the information were relevant for her study program. Furthermore, she wishes that it had been more clear where to obtain the information needed and have it sorted:

"*Where to hand in stuff, a place on Moodle where we receive general messages from all of AAU and another site where it's specific for our program.*"

The student Stig from Medialogy states that:

"*I mean they could have made small videos or something. Everything is better than a wall of text in an email. So I would say I was rather disappointed.*"

Although the statements above express a critique of the support and flow of information from AAU and could seem to indicate managing a university through an unprecedented lockdown is a simple matter, provided with an organizational context and understanding it becomes clear it is a rather complex situation to deal with. It can be seen in the following quote by Rune from CDUL:

"*The communication in the organization is just hard, it's really hard, sometimes you reflect on a video or instruction for how to use Teams for teaching, then you upload it to a website and you think "How far does this really reach?". But on the other hand, what can you do otherwise, it's not just applying the scattergun technique where you reach everyone, and it's not just about sending emails out to everyone – because you are not allowed to do that. Only the rector can do that. And from that to people reading their emails…. It's hard.*"

The choice of software and the guidance for teaching has been a debated topic for both students and educators in our interviews. Several interviewees expressed confusion and/or frustration about the guidelines for teaching, the choice of software, and the support hereof. A student in a focus group interview raises a critique of the university for not being prepared for the situation and explains that:

"*Jens* [Another student] *had to create a Discord channel for us because the university had not yet figured out how it should be handled. It should maybe have been a first priority* [for the university]".

Later on, the university provided software, Microsoft Teams, thereby providing a platform for online lectures. The student Stig explains how he felt they were simply given a link and expected to learn it on their own:

"*We received an email telling us we should use Microsoft Teams and then got a link to the download. But it seemed to be expected of us to download and use this program and learn it on our own* [...] *It's pretty much learning by doing* (...)".

Later on, more software was introduced to be used at AAU and Finn, an educator says:

"Suddenly Zoom arrived, then we were not allowed to use Zoom, then we were anyway if it was through AAU."

In the interview with the CDUL employee, Rune we received background information regarding the software supported and provided by AAU. He informed us that the reason for not supporting and advising synchronous teaching, in the beginning, stems from ITS which were worried about the capabilities on the university's digital infrastructure, and legal issues with potential new software.

Regarding the support of the new software, he explains that GDPR plays a significant role in this and that a data processing agreement needs to be in place before the software can be provided by AAU. CDUL has

throughout the lockdown been granted priority by the contract department at AAU so that new implementations could be expedited faster.

In our empirical data, we can find several examples of frustration by the educators about the lack of support. An educator Christine explains how they were told:

" (…) *To work digitally and make it work, that's the style of management, they shift the responsibility downwards in the organization* […] *we did receive tools at our disposal and were told that we couldn't cancel any* [lectures]."

Another educator Erik explains:

"*We're moving online. Yeah, that modality. I would have loved to have support from PBL colleagues* (...)"

However, the educator Finn says that they were "*thrown into it*", but that he received amazing support from ITS in creating a PowerPoint with voice-over on a Sunday afternoon. Christine says that she taught the course as if it were physical and tells us that if she were to improve on it, she would have to consider a lot more what it means to "(...) *go digital*". What going digital means is a topic central for CDUL. Rune stated throughout our conversation with him numerous times that conducting online teaching is a complex affair and that the conception of "*adding electricity to education*" is a gross simplification.

In the focus group interview with students from Techno-Anthropology, several of the students explained that they do not see AAU as the one that made it work during the lockdown, but rather their lecturer:

"*And in regards to teaching, I will refer back to my earlier statement that it was our lecturer who was the staple force. I don't have the impression that the university has done anything else than saying "do this"* (…) "

Regarding the support provided from the university both Erik and Finn ask for PBL guidance for facilitating online learning activities. Finn states that he could have hoped for:

"*Secure and well-established platforms which we are familiar with, and some courses* [in how to use them] *and that students should have the opportunity to take such courses as well."*

He finishes his point off by saying:

"*But it needs to be integrated as a part of PBL, it should not just be technical courses in Teams or Zoom, I should feel like it is giving me something because it is placed within this PBL framework, it would make me obliged to use it as a teacher and educator.*"

All of the above should be understood in the context that from day one of the lockdown, everything was abruptly moved online. An email was sent out on the 12th of March outlining the move:

Dear students at PLAN's educations

This is an extreme situation and we fully understand if things seem confusing. We like to stress that you are to continue being active students. This will however be in other settings and media than you are used to.

We will be informing you continuously, so please keep updated in moodle and through your AAU mail.

The university will be closed down tomorrow. It will not be possible to access the campus the coming weeks, so please collect books, worksheets, prototypes and other equipment today.

The following two weeks teaching will be carried out as:

- **Lectures are to be held non-synchronically**. This means that lectures will not be held through digital media live. Slides, video and other material and guidelines will be uploaded in moodle.
- The existing class scheme with timeslots is suspended for the next 2 weeks.
  - Your teachers keep you updated through moodle
  - I like to stress that you are not to expect high digital quality in videos etc. I like you to remember that this is a crisis situation, and that your teachers originally had planned another structure and format for the courses.

- **Supervision.** Supervision will be held digitally and 'live'. Here we recommend skype or TEAMS (http://teams.microsoft.com/). TEAMS are a platform accessible for all students at staff at AAU through the AAU mail.

- **Group work (students).** Group work is also to be carried out online and NOT through physical meetings. Skype, TEAMS, Facetime are platforms that may be used.

For all students it will be stressed, that all physical AAU activity is suspended. This also includes fieldwork and lab-work. You are encoruaged to carry on project activitities through online platforms.

Planned examinations in June: No decisions have been made yet. Information will come later.

You are always welcome to contact me, the study secretaries, the study board chairmen, teachers or supervisors if you have questions.

Kind regards Søsser Brodersen

Illustration 10 - Email sent from the head of studies at the Department of Planning

With every learning activity being moved online, this meant that a significant amount of learning activities were to be facilitated through different platforms (i.e. Microsoft Teams, Skype, and Moodle) and even group work and supervision were also restricted from physical contact.

The orders from on high were clear: The show must go on! But as presented earlier the educators felt alone in carrying out their learning activities, Finn requested PBL oriented courses, Erik would have liked help from his "*PBL colleagues*" and Christine was left with a feeling that the responsibility to make it work was solely on her without any support from the administration.

This support, which the educators in our research lacked in the lockdown period is the support that CDUL offers for educators before the lockdown. As explained previously, CDUL has a focus on the didactic and pedagogical aspects, but during the lockdown, they were forced into the same panicked emergency and fast solution-oriented modus as the rest of AAU. While this is understandable given the circumstances of the lockdown, and the prerogative that every learning activity should continue, it still meant that PBL suffered. Due to the lockdown, CDUL was withdrawn from their regular tasks and was placed into a state of readiness where the focus has been on *"*(...) *ensuring that the teaching and exams are conducted".* Before the lockdown, they worked on *"*(...) *developing and supporting digital supported learning activities"*. Rune describes that it has been turned upside down and that the employees at CDUL are employed due to their pedagogical and didactic competencies rather than technical competencies. They were not hired in their positions to provide the type of support needed as the lockdown occurred, they simply just had to do it.

In this chapter, we have started the analysis by outlining what PBL is and how AAU approaches it in a way that permeates the entire organization. Following that, we have detailed a timeline of how AAU acted upon the lockdown. We have presented the frustration felt by students and educators with the flow of information and the lack of support they have experienced, especially through the early days of the lockdown. This has been done to provide a contextual understanding that the following two chapters of analysis need to be understood through.

In the next chapter, we will focus on the experiences and adaptation of students and educators at AAU during the lockdown, which will be the final piece of the puzzle before we start analyzing how the online aspect has affected PBL. Analyzing this effect is not a simple task, hence the extensive preliminary work. This point is also mirrored by Rune, which we will allow to finish this chapter with his reflections about what happens to PBL when it moves online:

"*It is hard right, because we didn't have time to reflect on it. It means something, definitely means something* [...] *It changes things, you can't just… But how and what it means, that is really hard for me to pinpoint, and that is exactly why it is important that you work concentrated and allocate more time.*"

6 Mediated Experiences

In this second chapter of analysis we will answer the second research question which states:

How have the educators and students experienced and performed online learning activities and what mediative processes occurred with the applied technologies?

The lockdown at Aalborg University and the consequences from it have had a profound impact on how learning activities have occurred, and have required a significant amount of adaptation from its actors. This chapter will describe how the students and educators experienced lockdown, including their frustrations and problems.

As this study was carried out throughout most of a semester, it has been possible to examine how numerous situations have unfolded from different perspectives with different perceptions. This study furthermore, presents a pragmatic and post-phenomenological object of interest, as to unfold how online learning activities are being perceived and how the technologies mediate and affect its users. Drawing upon Dewey's terminology, theory of inquiry of the technologies used within a cultural and social context can help unlock concrete distinctions and relations from arising situations.

6.1 Comprehending the Context

Uncovering how previous expectations have been influencing the use of the technologies and what outcome it produced can, in Dewey's pragmatic view, solidify and enrich a metaphilosophical elucidation of a given dispute (Hickman 1992). Statements and observations throughout this study can become gateways into exploring what constitutes the situations at AAU during the lockdown, and as such examining the experiences of our informants combined with our own experiences can deliver valuable insights regarding former and contemporary processes related to the COVID-19 situation.

6.1.1 Frustration and the Initial Reaction

Immediately following the lockdown the situation was one of chaos. As described previously CDUL went into emergency mode. Every resource was aimed at making things happen in any way that it could. Gone were ideas of PBL, didactic and pedagogic, the only goal right then and there was to keep the university's daily activities going. This alert modus transcended the university and its inhabitants. What resulted was an initial period of chaos, and to battle chaos, structure and organization were the frontline fighters. The chaotic circumstances required immediate adaptation from all levels within AAU, which Rune from CDUL felt from the beginning of the lockdown:

"It completely changed. We were pulled out of our ordinary tasks and were put in this emergency state."

As mentioned, every project CDUL was in the midst of was put on hold to support the massive transformation to exclusive online learning and research activities. CDUL had to support the staff and educators in the new platforms used for communicating and doing research. By delving further into the perceptions of both staff

and students, cases of frustration arise, which depicts the reception of the lockdown. Numerous learning activities were fundamentally changed, which both impacted the current research and project work.

"We have been prohibited from going out in public, even though society has been open. When you are a techno-anthropologist you don't go into a lab, because the lab is the world. And I have had students who could not go out and conduct fieldwork, not because the field was against it, but because of the rector saying no."

Having both a role as an educator and researcher at AAU, Christine recognizes the problematic nature of being barred from researching the physical world, as fieldwork was prohibited during the lockdown. Turning to Dewey, this lack of *instruments* decreases the ability to perform fundamental practices (Hickman 1992).

A general feeling amongst all informants has been those of frustration and confusion. Especially in the earlier days of the lockdown, these were, perhaps understandably, present. It ranges, from a student in his general comprehension of the university's dealing with the lockdown to diminishing how some educators have handled the situation:

Student Stig*: "So it seems like the university is hoping for the best and planning for the best instead of hoping for the best and planning for the worst. So they have always been behind and had to catch up instead of having planned for the worst and saved some time. It has frustrated me a lot."*

Student Brian*: "And then there has been a lecturer teaching Autocad, she had a mac and it looks completely different on a mac than windows computer, so again over half of the students could not find the information in the program they needed. It has been a circus."*

Student Morten: *"It has not really fit in that we should have a Q&A session, and when I pointed out that it was a complete joke, it resulted in even greater confusion. Suddenly I was sitting with three different lists of dates, one lecturer following one and talking about the other, and another lecturer making the third one, which we followed. It resulted in some hassle."*

Educators themselves have felt these problems, feeling left alone to handle the situation or understanding the problems of their students:

Educator Finn*: "But I felt a bit left alone where there were just some videos I could watch, it was some intro videos for Zoom and Teams. On the other hand, It's like: "what the hell else should they do?". They could not come to my house and set something up. I do not know if they could have done something different but there was a lot of learning by doing."*

Educator Erik*: "I suspect that a lot of groups* [...] *have been under extreme pressure and are rethinking their projects."*

These feelings of frustration are present throughout most of the situations that were experienced by educators and students during the lockdown. Stig sums up his feelings about the lockdown in the following quote:

"It is very frustrating, and there has not been a concrete answer to what we should do or how we should respond to it."

6.1.2 The Physical Aspect

As the lockdown came into effect, many learning activities central to study programs at AAU were simply prohibited. By perceiving the physical world as the material needed for being able to conduct learning activities, it becomes apparent that having access to relevant tools is needed. Dewey sought to understand how technological artifacts change human perception, which he argued, is related to what they portend (Hickman 1992 p.4). We also, especially as techno-anthropologists, seek to examine what technologies portend or mediate, which calls for an understanding of the socio-technical premiss made concerning them. Similarly, materials ought to be perceived as multistable, as both physical and digital artifacts can be experienced, used, or manipulated in different ways from different perceptions.

Students at AAU quickly became aware of the impact that the facilities and tools at AAU had, by being unable to interact with them. For some students it was access to laboratories that were missing, as explained by the student Troels:

"We were also supposed to access the electronics lab at CREATE, but of course we didn't get access to it. So, we basically had a whole course this semester that is pretty much worthless."

Another example is seen concerning printing documents by the student Sara:

"It complicates the work enormously; I have lacked access to the printers because sometimes I found it easier to sit with the paper and then mark. So, in practical terms, I have really lacked… This is probably where I have missed AAU the most, it is in relation to the printers."

For other students, printing is more than simply working or learning in in a different style with documents physically in their hand, for them it is an integral part of their program:

Student Brian: *"In the first semesters, the first two semesters, it is free for us to 3D print, plotting and using the laser cutter at school, something that will later cost money. In the first two semesters we have it so we can learn through trial and error."*

One tool at the campus that a lot of students missed were the whiteboards:

Student Sara*: "Yes, we also miss our whiteboard very much in relation to project work."*

Student Stig*: "In our groups we have different post-it boards and whiteboards that made it possible for us to organize our time and space according to a schedule and what to-do lists we had lying around of what we were doing."*

Student Brian*: "We do not have the same overview as we would have in a group room. We do not have a SCRUM board or any type overview of our process* (…)*"*

For some study programs, the more practical work takes up a larger portion than others. If a study program relies heavily on physical artifacts, i.e. models, robots, or designs, the lockdown has proven itself as a harsh inhibitor:

Student Kasper: *"I have a Game Dev course, where when things were still physical, the idea was that we had a day where we showed up and presented our games so you could go back and forth, watch the other person's demos, trailer and so on and so forth. It has, of course, been turned into a digital event, and it happened in a very chaotic way."*

Student Brian*: "Especially because it is a very visual study, we usually have to make posters and bring models to these status seminars which we do not do at all now."*

Student Hans*: "I think the lockdown definitely did not help us because we picked something that was very physical, in the sense of we were trying to make a project with robots, and then doing this during the quarantine made it so much harder because we couldn't make the physical robot."*

For another student being able to physically access, touch, and feel the products she was working with and through this learn how to master them has been missing:

Student Sara*: "I just miss the closer relationship to materials, in relation to knowing their properties and through this better being able to come up with redesigns and such. Here I feel it is a little too distant, we are a little too distant to materials."*

For one group of students they had to figure out how to learn to use an Arduino, a microcontroller, remotely with only one student having access to the physical computer:

Student Emma:*"* (…) *Even if it was possible for us to make it, it would only be one or two of us who would actually know how it was put together, because we had one Arduino kit in our group and most of the time it would be at one place and it was mostly me who worked with it, so I feel like that would also screw what people knew in our group and who worked on what.* […] *We would have to find a way to actually test physical products, which also would be hard under the lockdown."*

Not only have students been missing the artifacts and tools that come from being physically situated at AAU, but an educator also explains in the quote below the peculiar experience of having to teach students how to create and use tools without being able to test them:

Educator Christine: *"* (…) *Actually create a concrete tool and try it out in practice, it only became something like that, it was what they could try at home in the apartment* [...] *It was weird to teach how they can do physical things while we just talked about it and nothing was hands-on."*

A problem related to exclusive online learning activities has for several students and educators been a lack of all the interactions that happen outside the time and space designated for learning. Simply being physically present allows for a freer exchange of ideas, it allows for small talk that can actually help to solve problems or generate ideas, and it allows for people to interact between departments, programs, or semesters.

Some educators expressed this problem with how they missed their collegial interaction:

Educator Erik: *"Also, one thing that I've learned is that the coordination that we do best as teachers is physically, in the same building, when we go for coffee or I just go and knock on the door of some colleague. They do the same. And we have a ten minutes conversation, where we sort out a bunch of teaching related issues. That was not happening."*

Educator Christine: *"Those little things that we know well and always laugh about, that is, those water holes* [...] *at the coffee machine, the lunch break, down in the canteen, when you just walk by, etc., you discuss with each other and think about it, you don't do that… When we are digital then we are digital, then we have an agenda for this meeting, for this interview or this supervision or this course.* [...] *All the informal disappears. It is completely gone, there is actually a lot of the knowledge that we gain in informal situations."*

For the students, they especially experience how some questions or thoughts might not be worthy for them to log in and write to their group, wherein a normal group area setting the interaction would flow freer. Below are two reflections from the student Brian how the technology-mediated communication hinders him:

"So, there is something about not just sitting with a question right now and here, then there has been something about writing a messenger message to the group […] *Where in the group room you just asked out in the forum. That is missing a bit, I think. "*

"… It also takes more for you to talk to the others about it, if you have to send a message where you may have been sitting with some things if you had been in a group room then you had just asked them, but if you sit alone you think "is this is really a message worthy"."

Brian points to the same issue, that he is limited by the technology that is required for him to interact. It requires a higher sense of urgency for him to discuss problems or ideas with his group members when it is solely online compared to being physically present. Brian also reflects on his creativity is being limited from this aspect:

"There is a lot of idea generation and suggestions for how it could be and then you sit with something yourself for maybe a couple of hours and make a plan for, it could be, design or… And then you present it afterwards there is no back and forth communication, it is very much like sitting alone, telling, deciding. There would have been better flow if you sit physically together. Because the ideas just arise all of a sudden when you are sitting with something."

By removing the physical aspect from the learning activities, but also from the social elements that influence informal situations, both students and educators have experienced the importance of being situated in surroundings that are sufficient for learning and research interactions. Being isolated limits the possibility of formal and informal interactions, which digital communication can support but not replace.

6.1.3. Freedom

Analyzing the empirical data reveals that many external factors exist that influence the perception of the digital technology being used during the lockdown, which for a vast majority of individuals affected their physical work settings; often working from their private homes:

Educator Finn: *"I can tell from my work effort during the last 2½ months that it has increased by around 20 % and I shall tell you, that I already work more than 37 hours per week. And if you add 20 % more to that, it then becomes a great amount of hours and it was especially the first 1½ months where I did not really have control over myself in this context, as I was working all the time, from waking up until I went to bed."*

As described by Finn, the lockdown had the effect of adding additional work to an already overburdened work schedule which was confined to his private home. It has become clear that the COVID-19 crisis' influence on common routines and practices led to a degree of disarray. Some chose to escape the confinement, others as Christine, began to blend their leisure time with work-related activities:

"You get disturbed, and it is like, the first four weeks I had the feeling of being on Christmas vacation while having to work. I had to fill up the refrigerator and cook, then suddenly I had to make a toast, and then all the work on top of it. You then take a break and suddenly you are behind and you have to work until midnight.

How do you get this structured and when do you take time off, since you never really have time off. It means you have to find a rhythm."

During the lockdown, both educators and students succumbed to doing other activities than work or study-related activities, as being isolated and at home presented an element of freedom. This freedom entails flexibility towards organizing and structuring daily tasks. Just like de Jong, Krumeich, and Verstegen (2017) concluded, an element of comfortability should be present if the digital mediums and the setting shall function in a proper process. This can arguably be seen as an overarching dispute, as depicted in the aforementioned quotes, to whether an exclusively digital approach to learning activities during the lockdown, provided affordances needed for the affected individuals to achieve a healthy balance between leisure and work.

A problem several informants express they have experienced related to freedom is the lack of structure working from home that results in work hours being in a flux. When to work and when not to work becomes an issue. This issue was especially present during the initial stages of the lockdown:

Student Emma: "*And I think for me the worst part was that the work on the project and our free time kind of blended together and personally I really like to split those up, also just because when I'm working and when I'm in my free time I have two different mindsets and it's hard for me to mix those two. So that was a struggle for me, at least."*

Student Kasper: "*I'm not able to separate things when it's all online. So it's such a situation where I get up and work until I go to bed and then I take a day where I do nothing* […] *There is to that extent a more fluid boundary between when my work life and private life changes, compared to what I want."*

The quotes above describe how they have had difficulties adjusting to the new conditions, and how it resulted in more hours than usual. As the last quote explicitly states, the person is aware of the problem, as they all are, but is unable to change it.

Previously, the separation of leisure and work was framed by the outer structural conditions, such as a distinction between an office or a university and a private home. As these have transformed into the same thing during the lockdown, some informants have experienced the shift as problematic due to not being able to have a structured daily life.

"It is a bit different for me compared to the people in Aalborg, since i do not usually work from home. In relation to lectures, i do not work from home. I know that like everyone else, I sit and write all the time before a project hand-in. But it does mean that because of the time of transportation, which takes two hours each way, I actually have time to read. So I have structured it, so when I get home I have the rest of the day off. And when you suddenly come home with work, it feels like you do not have any private space. You always feel like you are at work when you sit at home."

As the student Morten describes, the difference between studying and having time off was previously apparent as the travel time to Aalborg was used for study-related activities. During the lockdown, this was turned upside down due to the physical constrictions. Another problem with freedom and flexibility is as Kasper express when he further reflects on what freedom has resulted in for him and his group:

"*The benefits are my personal freedom. The downside is others' personal freedom. […] The amount of freedom is proportional to how many problems you get when working at home. So that's kind of like a double-edged sword."*

While freedom has resulted in flexibility that has helped a lot of the students, the aforementioned quote depicts how freedom can be a problem through a lack of structure. The other aspect of freedom, asynchronous lectures delivered through video, is for many of the students also an advantage:

Student Brian*: "So a pre-recorded video is nice because you can refer back to it when you need to."*

Student Kasper*: "The advantage if it is something technical that needs to be explained, e.g. in relation to programming, is that if it's a video lesson then you can just go back instead of interrupting the lesson."*

Drawing upon Dewey (2004), the notion of experiences are shaped by the expectations set, but as seen with the lockdown, there were not any expectations made. The alignment of expectations was in a certain way disrupted as the situation was unknown and imminent, but valuable experience can be fostered from it, which also is recognized by AAU Professor Thomas Ryberg:

"Everyone is quite entreprenant - it lies within the PBL-model that by giving people responsibilities and telling them to try and come up with solutions themselves, it shows that people actually know a lot. And you could ask, how the hell are people actually working PBL-based every year and how do they incorporate useful technology for their group work? Because every group does that on their own."

The notion of PBL and how technology often is adapted to accommodate the criteria by the students themselves is relevant for uncovering how technologies are being used and what mediating attributes they pertain to. Adding a post-phenomenological layer to our understanding contributes to a holistic depiction of how, for example during the lockdown, technologies have been perceived and what experiences, and thereby knowledge that has transpired.

6.2 Adapting to Online Learning Activities

With learning activities suddenly conducted on Microsoft Teams and Zoom, previously limited in use by both students and staff at AAU, but now as exemplified earlier, they had to be learned and practiced for them to provide a solid foundation. The human-technology relation has then become imposed by external factors, and how technological relations during the lockdown has influenced perceptions, but also practices, can be argued to relate to the element of multistability. As the lockdown prevented physical learning activities, both group and project work, lectures, and exams were affected by the situation. The different digital technologies applied in the midst of it all were both a source of possibilities and frustration, as the physical restraints combined with distance communication created different types of technological relations. As Ihde proposes, a study of how technological embodiment and multistability emerges in a context can help:

"(...) *develop an interpretation or understanding of the things in their experience that is profoundly shaped by the systematic amplifications and reductions of their tools."* (Thompson 2006, p. 116)

The following sections will examine how the technologies used by both students and educators at AAU was experienced and what technological relations manifested.

6.2.1 Group and Project Work

The lockdown and its effects affected how student groups organized themselves and approached the digital platforms suggested by AAU. Microsoft Teams seemed initially to be the dominant software proposed since it could function as both a conference call room and a screen sharing tool. An issue that became apparent was a lack of technical support or a lack of missing features, which led to groups organizing themselves through non-supported software, as described by the student Jens.

"We are using it [Microsoft Teams] *when interacting with other people besides us three. If it is just the three of us in the group, then we are using Discord exclusively. Unless, if we just had a meeting with our supervisor on Microsoft Teams, then we sometimes sit five minutes in there before changing over to Discord. So we are using Discord for group work and Microsoft Teams when we interact with other people, interviewing and supervision. A Friday bar was also held on Microsoft Teams."*

Instead of meeting physically, they met online on Discord. This structure was initiated, the day following the lockdown, by the students without any support from the university, which allowed them to continue their work. In perceiving these technologies from a post-phenomenological view, we seek an explanation of how an element of multistability can be seen within a social or cultural context, which in this study entails the online learning activities. If education seeks to promote and inspire different forms of learning, then to further examine and understand these processes as they transpire through technology, Ihde's relations becomes an essential tool.

It was apparent that many of the groups involved in this study changed their practices during the lockdown, and began to use software beyond the suggested from AAU, as their relation to Microsoft Teams seemed insufficient in providing an embodiment. When technology foregrounds itself it will become a disturbing element in how humans interpret and perceive the world around them. Thus in Ihde's understanding of human-technology relations, moving between the different relations is not an issue in itself, but visible breaks with a relation as with Microsoft Teams foregrounding itself is problematic. The embodiment relation transpires when the technology helps in creating a connection to the world, which was not the case with Microsoft Teams. This is furthermore depicted by the student Stig:

"The way we have created our group room on the Discord server is that there have been created enough voice channels for everyone to have their own, so even if you are sitting and are working independently, you always sit within your chat room. You do not have to have the microphone turned on, but always with sound on, so people can come in and ask you about anything or get a status update, and then people can jump back into their own channels."

The features provided by Discord have helped the aforementioned group in achieving some of the aspects missing from Microsoft Teams, which thereby, helps to solidify and sustain the needed elements for group- and project work to function exclusively online, i.e. several voice channels. With these voice channels and how the group used them, they reached an embodiment relation with Discord, as the software manifested itself as a digital group room. Furthermore, we see several groups that reach a background relation with Discord; when the software operates as it should and performs the duty the group expects, it no longer presents itself to the students as a piece of software they are using but is a part of their world without being noticed.

As technology continuously affects the social world, the mediating processes, which in this case revolves around establishing optimal work-structures, technology needs to provide affordance in the context of use. The individual perceptions are, from a post-phenomenological standpoint, constructed through the former and contemporary experiences made, and since some students were using Discord before the lockdown, it can be argued that human-technology relations were already established beforehand (Verbeek 2006). As

Discord did not appear to be a source of frustration in our empirical material, it quickly became a major cornerstone in many groups' practices. The embodied relation often transpires through, concerning group- and project work, their technical skills, and the embedded technical abilities provided by the platform, and as Ihde suggests, it is only occurring when a certain degree of tranquility is achieved (Verbeek 2006).

Along with Microsoft Teams and Discord, other software or platforms were also being experimented with during the lockdown by the students. Many of the previous physical tools related to a physical class- or group room were missing, thus, hindering the traditional approach to their work processes. Sara describes this experimentation:

"We have our own Microsoft Teams room for our project. There we have a group wherein we can meet, you just have to create a meeting. We have also, in the beginning, used OneNote, which is a complementary program in order to get some sort of a whiteboard. But it took so much time to draw in the program, which was not so optimal."

Having the opportunity to draw on a whiteboard is not included in Microsoft Teams per default, which is why Sara's group decided to compensate. Many of these experimental processes and platforms take time to find and learn, and no guarantees can be made for their useability. It can be argued that a background relation must be achieved so that a platform or software acts invisibly and fluently, which the student Stig found challenging. Others were able to incorporate external platforms in a supportive fashion, as described by Stig:

"What we also did in order to properly knowledge share, what we did…. we used another program, we used Trello, it is like a site where you can manage cards and put them into different categories, you could also assign names, like individual people…"

By incorporating the platform Trello into the group's work structure, they gained a systematic way of assigning and reorganizing tasks to the individual group members. Within this lies both an embodiment and hermeneutic relation, as the combination of Trello and Discord created a solution, from which to communicate through but also an approach to visualize given tasks and objectives. During the observations of group work, it also became apparent that Discord was helping in maintaining close communication while also providing some technical features which Microsoft Teams was lacking:

"Discord seems to be working fine for group work, as both the streaming function and the voice functions are working quite optimal." - (Svend fieldnotes)

"Seems they all are using discord. We got in, group of 6 people in here. One of them is streaming their work on discord, so easy to follow! Love digital natives!" - (Benjamin fieldnotes)

We, as observers, were already familiar with Discord, as it is a commonly used software within our own digital worlds. It was therefore a technology that already had manifested itself in our daily practices, which made it interesting to experience it in study- and work related contexts. Other students highlight the fact that they have been forced into new situations during the lockdown. Below is a quote from the student Jens:

"We have been forced to learn. And we were forced to adapt [...] *Comfortable in the use of this IT, in these IT solutions, meetings, interviews all those things. I think this is super healthy for not only us, we are some of those who have probably had it the easiest, because we are so used to computers with our age. But especially for us, generally our generation…"*

Jens both draws attention to the fact that they were forced by the lockdown to learn how to use ICT in every aspect of their work, but also reflects upon how growing up in a digital age combined with his previous

knowledge and experiences, has helped him and his co-students to adapt. This is a clear example of a concrete achieved experience through the lockdown, which through a reflexive process results in new knowledge and solutions. One his group members, Morten, also explains how he draws on previous experiences at AAU and the use of video conferences for lectures in the past and how the current use of online learning activities have performed better:

"With the experiences we have with online lectures, where we have been at CREATE and have had lectures from Copenhagen via video conference. But also the lectures we have had in connection with another course, because the course took place in Copenhagen, this has worked much better."

Troels, from another group, recalls previous experiences at AAU in project work and how these have prepared him, to some degree, for how their group worked during the lockdown:

"So we have always, in all the groups I have been in since I started, in the final sprint with projects we have used Skype and so on. So the thing about working together over digital media is not new, but there have been some new areas that have had to be tested via digital tools."

Troels reflects as well on being required to adapt to a new situation and what positive aspects it revealed:

"Yes, well one of the things that I actually think worked quite well was that we learned a lot of new approaches in order to structure things that worked better on the individual basis as well as group basis compared to what we did before [...] *So I would say that in general, we have gotten a lot of good things out of the lockdown in the sense that, we all now have experience with the decentralised organization and conducting project management online and digitally instead of only physically."*

Troels appreciate these new experiences so much that he goes as far as advocating that all students at a university in the future should go through the same:

"It would actually kinda make sense if pretty much everybody in the future got a semester where they did pretty much everything digitally or at home because you learn something you can't learn when you show up physically all the time. So even though there are a lot of problems with this, I still see the idea and benefit of having at least one semester of doing things this way."

Troels points to previous experiences, working on Skype in the final stages of a project, and then moves on to how he and his group have learned through their lockdown experiences about digital project management. He bases how well he managed during the lockdown on his previous experiences that evolved through new situations. For Troels, the mixture of his earlier experiences, present practices, and desired outcomes constitutes his future experiences.

Nearly all technologies require an understanding of the attributes they portend, but it has become clear throughout the lockdown that both educators and students draw on previous experiences to establish concrete perceptions. These, as seen from a Deweyan perspective, are what constitutes the contextual processes which from a post-phenomenological perception relates to the active engagement with the world. We should not strive towards the same conditions regarding online learning activities as before the lockdown, rather, the former experiences should in this regard be acknowledged as repertoires wherefrom positive and negative elements can be derived.

6.2.2 Supervision

One aspect that appeared to work well for both educators and students is supervision. For the educators they have had easier entry into this world compared to that of teaching, as explained below by the educator Erik:

"So what have I learned? I learned that I don't know how to do online teaching, but I'm very good at doing online supervision."

For both educators Finn, in the first quote, and Michael they have learned through the lockdown that supervision has worked well, and they would like to do more of it in the future:

"Especially in relation to supervision I can see it. In fact, I believe that some supervision can easily happen digitally, and in fact can be much more qualified, the moment you kind of think about the process, what you do and in what order you do things."

"It was easily done, I expect in the future we will have a lot more distance supervision via Teams or Zoom or whatever we will use."

For the student Jens the new platforms helped create a channel, or access, to their supervisor and educators they did not previously have:

"It has opened a new communication channel for the teachers. We write on a regular basis messages to him on Teams when it's just a short question. It's something like that when, for example, when we send what he has to read, we do it through Teams now instead of mail. [...] the difference between email and instant messaging. It just feels different. I can just as quickly ask a question and it does not have to be as officially set up so it has been really nice."

This is a depiction that resembles, in regards to a pragmatic understanding, that previous experiences with supervision can lead to new practices with the desired outcomes in mind, as supervisor meetings in a traditional sense are framed by the formal expectations of a teacher-student relation. Microsoft Teams does not only shift the relationship from formal to informal, but it also supports various functions, which points to its multistability. It complements the traditional way of communicating through email, as it is perceived as more efficient and with additional features.

Even though supervision was also suggested to be facilitated on Microsoft Teams, one of the groups ended up having supervision through Discord, which the student Hans reflected upon:

"I think a big point for me is our supervisor, after the lockdown when we started meeting on discord I think the things between us became a lot informal [...] and was much more honest and open with us and we were more open with him and I feel like I got a lot more from this supervision during the lockdown than before or more that I did in my previous semesters, purely because of how informal it was."

Shifting from physical to online supervision resulted in Hans in a new relation to his supervisor, as the informal character of being on Discord made every involved part more honest and relaxed, which is a clear example of a positive meditation transpiring through the use of the platform. The supervisors asked, in regards to this study, were also experiencing some positive elements from facilitating it online, which appear to relate to the maturity of the students. As students progress through semesters, the accumulated experience of studying and writing projects should result in more independent beings. Erik however, recognizes that there exists a challenge of adapting and structuring the supervision:

"The problem with a project and supervision is access to the field for the students, because obviously a lot of organizations have changed their way of working and so they needed to recalibrate what they were doing. [...] I haven't counted the hours I put into it. But I suspect I put in more hours than I was supposed to."

The lockdown resulted in the supervisor having to support different ways of working due to the exclusion of physical fieldwork, which also meant adding more hours into preparation for supervision. Hans and his group have managed to create a relation with their supervisor through online platforms that relegate the relation to a more informal character, thus improving it.

6.2.3 Lectures

With the entirety of AAU's learning activities being forced online, this either led to asynchronous lectures with pre-recorded videos and texts to read or synchronous sessions on platforms such as Microsoft Teams. Throughout the lockdown, cases of irregular and frustrative relations to the applied technologies emerge, which depict that both asynchronous and synchronous forms of teaching can be improved, also in regards to PBL. As the situation was imminent, many educators were also recognizing the shift as a learning process, as noted by the student Kasper:

"... so it has been clear from the start, that it is a learning process for them [educators] as well as for us, which is why it is important we change and adapt things in order for the changes to function."

Since many educators had little experience in facilitating online teaching, many procedures were constructed without any prior knowledge of the effectiveness. As noted by Gibbings, Lidstone, and Bruce (2015), the perceptions of the technologies used within the learning situations play a critical role in the use of them. If the perception of a technology is negative, it can lead to a disjunction between the user and the technology, which should be attended to. For educators, their attention has been on making lectures viable. For the educator Finn, he could see himself using a hybrid variation of online/offline learning activities.

"… based on my current experience, then I will seek some kind of hybrid. I can easily see it, doing voice-over on PowerPoint even though it is extremely time-consuming, but now I have made it. [...] take a direction where I would try for more direct interaction. Do a combination thing."

Finn recognizes some useful aspects of working online, and during the lockdown, he learned how he would use online aspects in future learning activities in a hybrid format, i.e. PowerPoint with voice-over as a tool, and then seek interaction in a synchronized setting. The professionalism embedded within the role of an educator as Christine reflects upon:

"And then there is the thing of having to do a lecture while there are animals and people in the background, which somehow I could not. It is important that I am professional, which was hard to align with being on for four hours straight. [...] So what I did was I started recording the lecture. I found a cheap tool; a vodcast tool. Then I would sit in the only room where other people could not enter, in my bedroom, and then I just recorded it."

The description made by Christine contains the process of realizing that the physical setting prevents an undisturbed facilitation of lectures, which then led to an asynchronous or flipped classroom approach. The asynchronous element was at the beginning of the lockdown often applied, which some educators saw as limiting the overall learning experience, for instance as Erik explains:

"So the single lecture was packed into 4 videos, or 3 or 4 videos, because I thought it would be more manageable by the students, to look at a short video than a long one. [...] So the point is that recording the video doesn't work, because it's just me and the slides and some software."

Having a physical audience present and tools available, such as a projector, are elements that Erik is missing, which is both a sign of his perception limiting the use of pre-recorded videos and unstable technological relations. Through a post-phenomenological perspective, this becomes visible as asynchronous teachings are multistable phenomenons, which are perceived differently.

"I think it is fantastic with recordings of lectures and being able to go back, if I feel there is something I would like to see again, which I think is pretty awesome."

What the student Brian is describing above, is the notion of a hermeneutic relation, as he can rewind to the parts he needs to understand better, which in a regular synchronous session would be impossible. Pre-recorded videos for lectures provide flexibility, in regards to when to watch them and the possibility of rewinding, albeit, there is no real-time interaction. Being able to view the videos in the tempo a student wants, view them when it fits into their schedule, or even go back and view them again before an exam, are all benefits from this format. The interplay between students and educators is however also recognized as a central element in performing an optimal lecture, which led to some educators starting to include elements of synchronous sessions. Even though the synchronous element did provide interaction between educator and student, it was not always perceived as functional, since Microsoft Teams through its use revealed some challenges. The technological relations appear in situations where the communication is flowing from educators to students and vice versa.

"I think what I have learned the most from digital teaching is, and it goes for both lecturing and supervision, that it requires a vast amount of control from the teacher. [...] but I think you would have to be much more structured. Really making groups and people responsibly; you are to present this and say something about it. You need these responsibilities to be clear. Then you can not sit and hide within the digital."

The apparent frustration regarding difficulties in facilitating synchronous lectures, as the statement from Christine shows above, is perceived troublesome due to every individual being at home behind their computer, which is experienced in sharp contrast to having lectures in a physical classroom. This is also supported by Rose (2018), who highlights the importance of structuring online learning activities and having everyone in agreement on these, for learning to transpire. Many of the underlying processes during a lecture influence the actual learning activity, and thereby the outcome. As the visual representation becomes embedded within a digital platform, many physical gestures and interactions are then, in some cases, suddenly disorganized and eroding, which is also noted by many students.

"It is clear that it is much more impersonal. You can, or I could for example, feel that my lecturers, some of the energy which normally is there when you also can get feedback and response from someone while talking, that it disappears. It is like I just sit and talk into my screen."

Again, it appears as the physical distance between the educator and students plays a role in the perception from the student Kasper, which points to an unsatisfactory relation towards the digital structure in which the lectures are placed within. Likewise the educator Christine finds synchronous lectures to be missing in interaction:

"I feel that with the digital you shave it down to simply presenting text."

It is notable how the different technical designs of the platforms, such as Microsoft Teams, influence, and mediate gestures, which often resembles a traditional approach to teachings. The educator Erik points to both the PBL aspect and the interaction that usually is found in courses, and how the online learning activities have failed to achieve this:

"… especially as Aalborg University is a PBL university, because I can see how you can record the video [...] But if you want to engage a student in doing activities, in my experience, the asynchronous model didn't work very well."

6.2.4 Webcams and Visuality

As the lockdown progressed, perceptions regarding the visual representation of oneself and the surrounding environment emerged through the empirical data. Both educators and students had experiences regarding visual representation, which often revolved around how webcams and the mediative effects thereof influenced the online learning activities. The webcam technology, which today exists in nearly all laptops, were a source of frustration in situations wherein interaction was required but failed in establishing a meaningful relation between the human and the technology. During lectures, both students and educators noticed how the visual presence, in varying degrees, affected their behavior. It became apparent that there is a distinction between one-way, passive communication, and multiway, active communication. For many students, the effects of being visually present translate into the notion of physical awareness, which relates to a disrupted background relation which is not sustainable for a functioning interaction.

During the online facilitated lectures, situations where a webcam was recommended often led to students and educators not feeling confident in interacting with each other. The student Stig experienced from incorporating webcams into the learning practices as insufficient as the interface on Microsoft Teams reveals every participant present in the conference call. It does not, in Stig's view, resemble a physical setting where the educators stand in front of the students, which problematizes the effects of having webcams if the goal is to mimic the physical classroom. The technology and the actors do not establish a background relation, and if webcams are to become a helpful tool in future online learning activities, work needs to be done to establish this background relation. This is supported by the educator Finn, as his experiences with facilitating online lectures revealed problematic elements:

"It was worse than normal, since I did not feel I had the opportunity to look out into the classroom. Maybe there was someone who really wanted to say something? This is something you can see in a physical room. Like if someone is sitting and moves around in their chair [...] I can not read the students when there is a circle around them like there is on my screen now."

As depicted, Finn feels deprived of the physical gestures provided by the traditional classroom-based lectures, which is interesting as it appears that Microsoft Teams can mediate some parts from former physical lectures but not as a complete substitution, which becomes problematic if the desired standard is the previous physical ways of facilitating lectures. Even more so, as webcams became required in some online learning activities, some informants felt an element of pressure regarding their presence on video, as the student Sara reflects on:

"I do not feel comfortable being filmed. [...] It depends on the setup. If there is something I have to present and have to look at many documents, then I would not really be looking at the webcam."

The distinction between being aware of yourself while being on a webcam and not worrying about the presence depicts a technological mediated process of achieving a background or alterity relation since the presence of webcams, after some adaptation, can become an invisible artifact. A potential dilemma exists within the reasoning of expectations, as to how to be present while showing oneself through a webcam and what the remaining participants in a Microsoft Teams call are expecting.

"I think there needs to be a webcam enabled by the person who is talking, like if you are two people in a supervision meeting, it is nice to have a face on the person you are talking with. When there are many people, then it is okay for me just to see their profile picture."

As Christine has experienced lectures, supervision, and research activities online, her perception of webcams entails the importance of being able to see the person that is speaking, but regarding the passive participants within a session on e.g. Microsoft Teams, it is not experienced as a problem that they are not visual. She further adds, another reason for having webcams enabled during lectures is the possibility to visually check if her students are attentive:

"(...) you could also say that as an argument regarding asking the students to have their webcams turned on, so you can see what they are doing. I have personally attended something [...] where I turned my webcam off and then started to clean and listen to the radio. Then I could go make a cup of coffee and just sit and listen."

It is an interesting comparison made, which refers to her preference for having visual contact with her students, but on the other hand, she herself had the experience of leaving an online activity since her webcam was not turned on and nobody would know she was gone. The webcam can, during the exclusively online approach to learning activities, be perceived as a link between the individuals as it mediates a notion of recognition and interaction.

"The teachers which have done it live synchronously, they had webcams on. And I think that is quite essential [...] Like the pedestal is when you are standing in front of the blackboard or in front of something in the room. And it is the same as now, when you are the only person I can look at. I think that is important because otherwise I would just sit in the room looking for something to hold my attention:"

As the student Kasper describes, there must be an element of correspondence between the educator and students within the digitally facilitated sessions, which can help in securing a fluent transition to online learning for both educators and students. By having visual contact with the educators, it prevents Kasper from becoming discouraged and then ponders his attention towards other objects.

7 Online PBL and the Future

In this final chapter of the analysis, we will summarize the findings of the two previous chapters to provide insights regarding how PBL according to the Aalborg Model has unfolded during the COVID-19 lockdown. Following this, we provide recommendations to consider for further iterations of online learning activities and suggestions for where we assess further research is needed.

7.1 Problem-Based Learning During the Lockdown

In the last chapter of the analysis, we will try to assess to what degree PBL has been achieved and performed in online learning activities throughout AAU during the lockdown. In doing so we will take a critical stance. This will be based upon how AAU themselves present PBL and their goals for it, as presented in chapter 5, compared to the experiences of our informants during the lockdown, as presented in chapter 6.

At AAU PBL is embedded in everything the university seeks to do and thus, everything they do can be assessed through this lens. This lens points to their definitions and goals for AAU and the Aalborg Model. To do this assessment in a structured way, AAU's model and definitions will be used in this chapter. The first point of critique will be directed at the item in the Aalborg Model that states that courses support the project work.

7.1.1 Link Between Courses and Project

At AAU, a typical semester is made up of both courses and a project, though some semesters or study programs do it differently. A clear goal of the Aalborg Model is that these courses will act as a support to the project:

"In order to ensure that they become familiar with a wide range of theories and methods which they can use in their project work, students will participate in obligatory as well as optional courses." (Appendix C)

Courses are created to provide students with theories and methods that further their project work, thus creating a theme for each semester. Should the courses fail to do so, part of the academic foundation for projects would be eroded. In our understanding of this principle, as students for five years at AAU, this is one of the greatest strengths with the Aalborg Model.

When students describe, in the previous chapters, how they are unable to build models or robots as part of their course, how one student has the only Arduino kit in the group, or when an essential part of a course is demonstrations that turn into chaos because it is an online event, the ability for students to achieve their learning goals seems questionable. Through our engagement with informants during the lockdown we have experienced some that altered their learning goals to fit the situation and others that did not. The student Stig explains that while their learning goals for a course did not change, what they had to present as a product did:

" (...) We were supposed to build in this course as a part of a mini project, this mini project was intended to build and then test in interaction with users, and of course, we weren't able to do so. So the demands were

changed to something called "uncovering the mental model" which is a method for evaluating by looking at a sketch and explaining (...)."

For the student Sara, she also has experienced that while they did not change any learning goal they expressed that " *(...) they would evaluate us based on the context.*". Another student, Brian, had the same experience that the expectations for the exam would be altered:

"Well there has been sorta an acceptance that these things can't be done, and they kinda said they won't dig too deep into them at the exam."

While a match between expectations and possibilities of the students could be seen as an adequate approach in a lockdown situation, it still leaves the question of how PBL is ensured. With students unable to fulfill some of the learning goals for their courses, learning goals that are made specifically to support their project work, will they gain the knowledge and skills needed to satisfyingly do their projects?

With the practical aspect rendered almost impossible in many courses for students, the theoretical aspect remains, however, this has suffered as well during the lockdown, as both students and educators have explained previously in the analysis. One educator felt that synchronized online learning activities resulted in them merely presenting text; no real interaction or debate was occurring. Another educator highlighted how they would usually gauge their students for how their lecture was going and move in a relevant direction, something they were unable to do online. This lack of interaction is felt by the student Stig as well:

"It's not structured in the same way, you feel like you are watching a presentation more than participating in a discussion."

For the student Troels the courses and how they supported his project work completely collapsed during the lockdown: *"(...) it doesn't really feel like we had any courses it's just one big-ass project."* The same blurred lines are experienced by the student Morten:

"The differences between the courses weren't that significant in a way. There wasn't any clear separation between… This is the course, this is the project."

While these quotes can be read in a positive direction, as the link between the courses and the project worked so well it was hard for the students to tell them apart, in the context of their full statements in the interviews there is little room for positive interpretation; the blurred lines is a result of the confusion and chaos that has been present at AAU during the lockdown.

When courses fail to deliver the foundation for the project as detailed in the Aalborg Model, it does not automatically result in a lack of PBL. More aspects of online learning activities must be analyzed to make qualified assessments. In the next section, attention is turned to how group work has performed during the lockdown.

7.1.2 Group Work

A central part of the Aalborg Model is how much of the workload for the students are based in a group setting. In the *study activity model* the student based activities make up half of the model, in which they are doing different kinds of learning activities, but all in the group work format.

During the lockdown, group work like everything else has been relegated to a purely online setting and digitally mediated. For many students, this has resulted in problems as described in chapter 5 and 6, but also new ways of working to circumvent these problems. Some students have experienced how their group works fundamentally changed when it moved online, as expressed by the student Hans:

"I think for me, the biggest change I noticed was there was less group work, we just split out tasks, and go to separate voice channels. And we were just working there until we finished our tasks, and then maybe go into a group meeting and then most of the day was spent separately not together."

Like the aforementioned courses that felt like a mere presentation of text to a passive audience, this student's experience of group work has changed from active internal participation to a delegation of tasks that individuals complete. Another student that we interacted with explained how some days their group would meet online at 8 in the morning and simply discuss until 16 in the afternoon. All day only discussion, trying to structure their work and figure out how they would overcome the struggles of the lockdown and being forced online. But even these discussions have suffered, as the student Stig expresses:

"I feel like it has been extremely hard to be a part of the discussions, because you really are missing the physical aspect of being able to look at people and estimate how they react to what people are saying."

For one student we talked to, Brian, he had to start a new group during the lockdown which also presented new problems since they could only meet and greet on digital platforms:

"Like, the social in all of it, having to start a new group and getting to learn each other and your working style. It completely fails."

Group work has suffered through a lack of access to physical locations. It can either be that students are unable to use the printers and plotters at their institution or being unable to create products for their projects or courses. As described in the previous section, theory and practice in combination is a goal of the Aalborg Model, but with the lockdown, the theoretical aspect often stands alone, while also itself being diminished.

Students have through experiences, either before the lockdown or during, learned to overcome some of these problems and established a way to work together and advance their projects. But every single student we interacted with found it lacking in some regard. With group work permeating both the courses and the projects at AAU, it is vital for the Aalborg Model to be realized; students need to be able to have functioning online cooperation, and AAU needs better tools to support this.

7.1.3 External Partners

As one of the core principles of the Aalborg Model is collaboration with external partners:

"(...) through their collaboration with external partners, students are given the opportunity to work with authentic issues that can be addressed in their project work." (Aalborg University 2015)

Through collaboration with external partners, students are given access to real-world problems in which they can network, interact with experts outside AAU in their field, and apply theoretical knowledge in practice. During the lockdown, this collaboration has almost completely vanished. Students have from the university's side been banned from any type of physical participation in external locations, even if the location allowed

it. For the student Sara they still had some contact during the lockdown, but it was very limited and affected by the context:

"We had arranged some meetings with them, but because they have so much extra work currently they had to cancel."

For the student Stig and his group, they were in the process of obtaining external partnership when the lockdown happened and had to find new ways to test their prototype:

"Actually we were writing to different external collaborators, but of course it all stopped when the lockdown happened. [...] We have to find someone to test our prototype when it's done, but hopefully we can just find some people to do it."

While the students are often responsible for their own learning at AAU, another of their principles states that educators also need to help to establish and maintain relations to external partners, something the educator Finn tried to do:

"Well, I wrote some emails, tried to use my authority, and knock extra hard on some doors."

In a nationwide shutdown of society, it comes as no surprise that cooperation between students and external partners suffers. Caution and the safety of everybody, with a virus rampaging through the world, is paramount; external partners and collaboration take a natural backseat. This also means that for the discussion of the context versus general online learning and PBL, it is very hard to separate the issue from the lockdown context and make any statements about how it would be outside of a lockdown. We assess that likely many cooperative projects can be undertaken with a high degree of online activities with some physical presence as needed, in a modus that does not involve a lockdown. However, assessing purely how PBL and the Aalborg Model have been conducted during the lockdown, external collaboration has been hurt the most, as it has been mostly non-existent. As a single semester, the spring of 2020 has had to go without the learning benefits that come with external collaboration and thereby have a lesser degree of successful PBL.

We will end this section by how the student Kasper has had his supervisor propose how his group could react to the problems of the lockdown:

" (...) This was our chance to show how flexible and adaptable we were."

7.1.4 Exams

An area of PBL that has remained relatively unharmed by moving online, in our experience, has been the examination. As described per Savery (2006) and by AAU itself, a central part of PBL is an examination of the students' work concerning the learning goals. For every student other than those doing their bachelor or masters project, all examinations have been conducted online. As with most aspects of the lockdown, the exams and the time leading up to them have been plagued with confusion. The student Sara states:

"I don't have an overview really how we will end it. It's a bit unclear for me, and we have our exam on Thursday."

While other students agree on this confusion they see some comfort in the fact that they have experienced using online platforms throughout the spring, and as such, doing an exam through them will not be something

completely new. Most students express that while they are anxious about the exam, it is not something that is a big issue for them.

One of the online learning activities that we participated in was a project examination. Our talk with the group prior, during, and after the exam indicated that they as well had some nerves before the exam, but the exam itself mostly resembled what a physical one would entail. This was our experience as well, as indicated in the field notes below:

"Presentation went fine, again nothing out of the normal. We are in a question round now, normal part of the exam." (Benjamin fieldnotes)

"It has so far seemed like a physical exam, by how the question/debate/discussion is going. As long as the technical settings are working, it appears to be a viable way of doing an exam." (Svend fieldnotes)

In our interview with the educator Michael, which were conducted late in the data gathering process and focused on online exams he had facilitated, again the overall message was the same:

"It went fine, no problems. We did it over Teams and the students were ready when we were. We ran a tight ship, making sure not to delay. It was no different if it had been physical."

The only area that has appeared as an issue for the exams has been if any products or models were needed. One group handled this by anticipating what their examiners would want to see and took plenty of pictures of their model from different angles. As an emergency solution, this can work but will be a severely limiting factor.

For exams, the experience of students and educators was that it worked. Some technical issues were experienced, but limited and quickly solved. Everybody we interacted with that had participated in an online exam, shared the sentiment that it pretty much felt like a physical exam. Discussions and interactions between group members and/or examiners happened as it should. Besides the physical aspect of models and products it would appear that of all learning activities, the exam is the one that suffered the least.

7.2 Recommendations

Before delving into our recommendations there are reflections and a disclaimer that needs to be considered first. The setting of this research has been two-fold: online learning activities and the COVID-19 lockdown. Our goal with this project is to further the research and provide knowledge for online learning activities. But as we outline in chapter 1, everything that we have studied took place during a nationwide lockdown. Sometimes it has been easy to distinguish the two contexts and provide relevant points of analysis that only regard online learning activities. But many other analytical points are soaked in both; it was impossible to separate the lockdown context.

While we do not regard this fact as an invalidation of our data or coming recommendations, it is a weak spot in our work and needs to be clearly understood by any readers or people in positions of power that might use our work as a basis for new directions. The goal of this project is not to provide insights on how to facilitate education during a pandemic and lockdown, though knowledge in this regard can be extracted as well, rather the goal is to enhance future online learning activities regardless of lockdown status.

7.2.1 A Hybrid

A roaring agreement among all students and educators we engaged with was that the asynchronous format had some clear advantages. Educators could prepare material ahead of time, and once they were done they could be (re)used in relevant settings. For students, the ability to go back and rewatch either videos or slides with voice-over helped them structure their learning in both format and time. The format did however lack interaction, and several suggested, as will we, a hybrid solution. Videos or slides with voice-over can be used as a tool in lectures in a Flipped Classroom hybrid format, followed by synchronous lectures where interaction can happen, and learning takes place based on the previously viewed videos.

The educator Finn states:

"As I said, I could easily see some hybrid version based on the content of a course, do what makes sense. [...] Online lectures cannot stand on their own, they need to be complemented by something analog, something physical."

This vision is shared by the student Kasper:

"For me, the apparent answer is the two approaches I described which don't have to be exclusive. As I see it, there is no reason to do a pre-recorded video without adding a layer of interaction."

In the focus-group interview with the Medialogy students, they agree on the hybrid format. Stig states:

"I would actually like to see a hybrid when it comes to courses, where you use the best part of both systems."

The student Line agrees on his point:

"(...) His [Stig] hybrid idea is exactly what I wanted to say. I think that right now the university has no excuse on not uploading videos of the lectures, while still also having the physical lectures. Both of them should have a place and they have their own merits in the future."

By doing a hybrid where the best of both formats is used, the flexibility of the asynchronous format and the interaction of the synchronous format is combined, it is possible to utilize the online aspect in a positive direction while maintaining PBL and the Aalborg Model. This is our first recommendation.

7.2.2 Supervision and Distance

An aspect integral to PBL and the Aalborg Model that has worked, perhaps surprisingly well during the lockdown, has been supervision. In most regards, it has merely continued to operate as it should, but other examples highlight how it even has improved from being digitally mediated. A point that ties into supervision that has revealed itself as an advantage when forced online is how distances become insignificant.

Michael explains how he as a supervisor has thought it worked fine. For the educator Finn, he finds the structure in how he approaches his groups has changed, but perhaps for the better. Before the lockdown, he would comment on the group's material and then at the meeting simply go through the comments. Being mediated digitally has altered his structure and he found advantages to this:

"Lasse: But does this mean that there is more dialogue in your supervision?

Finn: Yes, that's the consequence. It is more dialogue-oriented."

Another example of advantages through online supervision is from the group that gained more direct contact with their supervisor. Having access to him on Microsoft Teams at all times resulted in them easier approaching him for questions or comments, rather than via email which could feel more formal and require a more serious or pressing issue to send.

The distance some people have to travel to attend learning activities is not only a matter of time, but it is also a financial one, either for the individual or the institution. Digitally mediated meetings if done properly has for some of our informants shown themselves to be a more than adequate replacement. Michael states:

"(...) This morning before I joined this interview I was at a seminar with some researchers from all over Europe. We did it on Zoom, and that saved a lot of travel expenses, hotels and food. We had a four hour meeting without any of that, that is smart!"

The student Jens also sees the potential:

"I hope it get used more afterwards, no reason to fly between Copenhagen and Aalborg, no reason to drive to Aarhus for a meeting. People get more comfortable with this type of communication. [...] I think it can be really good, because damn it really is a flexible solution. It's not perfect, far from, but neither is physical presence."

While some aspects have suffered greatly, supervision has been left relatively unharmed and even, in some regards, benefitted from being forced online. In the future supervisors at AAU could look to incorporate more digital supervision when relevant and as a benefit for both them and the group. Likewise using digital meetings when they are adequate could be a time- and money saver. This also opens up the possibilities of more cross-campus supervision at AAU, since the university has departments located in Aalborg, Esbjerg, and Copenhagen. This is our second recommendation.

7.2.3 Online Curriculum

As one of the biggest issues we have experienced during the lockdown is what we deem to be an attempt by AAU and educators to transfer their normal learning activities into online learning activities. There has been an attempt to do a 1-to-1 transfer, that has utterly failed. It is as Rune from CDUL pointed out, not simply a question of adding electricity to education.

Thomas Ryberg, a PBL e-learning researcher, states that the art of facilitating online learning activities is challenging and there is no simple recipe for educators to follow:

"(...) The most important aspect of online learning is that there isn't necessarily a cookbook. It's more like, as an educator, you take these things, use them and feel safe using them. Do something you can vouch for."

Ryberg also points to another mitigating circumstance for the educators:

"I mean, sometimes you forget that we aren't necessarily experts in teaching at a university just because we are experts in our field."

So who are the experts in education and online PBL, and where have they been during the lockdown? These are questions several educators posed when we talked to them. As the educator Finn explains:

"Regarding PBL there are some challenges. For courses it is hard for me to see, I can imagine and have hopes for the practices that aren't there currently, you know, support for PBL in a course structure."

Or the educator Erik who directly requests PBL experts:

"I would have loved to have support from PBL colleagues."

Erik continues to make his own recommendation based on the experiences he had during the lockdown:

"Online teaching should remain the exception [...] If we need to do it on a more regular basis, we need more expertise from someone. The thing is, who has expertise in that?"

Who indeed has expertise in online PBL? At AAU, CDUL could have been the experts that the educators are requesting. They are the personnel that could have aided with expertise in how to bring PBL in a didactic and pedagogical direction into online learning activities. Instead, they have been used for the technical aspects during the lockdown. This task could have been handled by other departments, for instance, IT Service who has this task as their main objective. Instead, AAU decided to use the one department they have available with precisely the expertise that is useful in this context and change their directive. CDUL even has representatives at each faculty that understands the different contexts of how learning is happening and how PBL manifests itself. While this is not a discussion we will delve into, as both learning and PBL is not one thing, and it certainly is not a one-size-fits-all, given this, CDUL could have been a perfect match for what Erik, Finn, and their colleagues are requesting.

Beyond the lockdown, however, it is CDUL and other departments like them, such as the PBL Academy and the various PBL research teams, that need to rise to the task of adjusting the AAU curriculum for online learning activities. Simply trying to force the current paradigm of education onto digital platforms will not work; it has shown itself not to work. Instead, there needs to be a re-invention of the curriculum and learning activities specialized for digital platforms and online interaction. This is our third recommendation.

7.2.4 Communication

The last concrete recommendation that we will provide is one related to communication between the layers of AAU. As presented in chapter 5, especially the students have felt overwhelmed with information and emails during the lockdown to a point where some considered it spam. An issue was also that the information was sent from what the students perceived to be an invisible sender far from them. There was no understanding who *coronavirus@aau.dk* were, or how to get in touch with anybody related to them if needed.

For this aspect, however, the context for which the issue has its base is the lockdown. Before the lockdown, communication to students was mainly done locally from relevant parties, such as study secretaries, study boards, or program/semester coordinators. These individuals are familiar with the contexts they operate within and as such are far better suited for filtering and delivering relevant information.

While this project seeks to make recommendations and provide knowledge for future iterations of online learning activities, this issue of communication is relevant to the lockdown itself, and while we do not seek to make recommendations for future lockdowns should they happen, the issue of communication was an unexpected but relevant one to address. As mentioned in the previous recommendation of 1-to-1 transfer, CDUL already has personnel in place at each faculty, and if more communication needs to happen relating to

new implementations of online learning activities, this personnel or someone like them, should be utilized as a resource for ensuring relevant information in an amount that fits both the situation and the faculty or study program. This is our fourth recommendation.

7.2.5 Further Research

As our last recommendation, we will suggest a range of areas that we have found through our work that require further research. In this section, we will briefly go over them, how we understand them, and why we suggest more research to be performed in these areas.

The first topic where we point to further research is what happens to PBL when it is moved online. As we learned during our literature review this is a very underrepresented area, while being a very debated topic in our research amongst our informants. This very issue has been the central one in our research project, and while we have found positives and negatives and can draw conclusions from these, we still regard it as a very underdeveloped topic. If PBL is to succeed and be impactful in an online setting, more researchers need to be involved.

A second topic where we suggest more research to be done is a continuation of the last one. As our most vital recommendation, we expressed the need to develop a PBL curriculum specialized for online PBL instead of trying to force the current curriculum and didactic onto digital platforms. More research is needed to develop these new methods and learning goals. This is also a continuous process that needs to be maintained as both new didactic research is done but also as curriculums and technology changes.

A third topic we suggest further research in is the use of webcams for online learning activities. As with online PBL, we identified knowledge gaps in the literature. Amongst our informants, everybody had an opinion about the use of webcams, how they could help interaction but also problems relating to privacy. We suggest both more research in general, but also the establishment of guidelines for their use. This could be both for institutions in general, but each faculty or study program at institutions could make their own guidelines for the suggested use and possible issues to be aware of with the use of webcams.

Our last request for further research relates to this very project. In this project, we have laid a foundation for action to be taken based on the context we provided. We find our work and results to be valuable, but on their own, they will do little to change anything. While our work is localized at AAU, other educational institutions are sure to find relevant analytical findings that can provide them with a basis for improvements to online learning activities. Using this project as the start for a participatory design project, interventional study or action research operating within AAU would be a natural next step.

8 Discussion

In this chapter, we will discuss and reflect on actions taken during our research. While our theory and methods chapter has detailed what we have done and why in this chapter we reflect on the implications of our choices. We discuss our theory, specifically the combination we have made of pragmatism and post-phenomenology, elements of our ethnographic work, and finally how we understand the concept and quality in qualitative research and how we sought to achieve it.

8.1 Discussion of Theory

To establish sufficient knowledge regarding how AAU, with all its staff and students, perceived the challenges that followed the COVID-19 situation, two paradigms within philosophy of science have been incorporated into the research design; pragmatism and post-phenomenology. These complement each other in different areas, such as the emphasis on accumulated experiences and recognition of technologies as constituting the social world (Verbeek 2006). By demonstrating a connection between a technological inquiry, as proposed by Dewey, and technological multistability, proposed by Idhe (Ihde 1990), many explanatory factors come into focus that contributes to a holistic understanding. We sought to describe, within a pragmatic paradigm, how AAU's adaptation to online learning activities in different ways affected other processes, such as the achievement of PBL or the incorporation of online technologies into study activities. A conflicting element appears as Dewey, in line with his view on instrumentalism, seeks to tie technology and rationalism together which constitutes the order of the natural world.

"Instrumentalism takes on a more concrete and definite character in the form of the thesis that the materials of belief, the concepts in which beliefs are formulated, are human constructions and not imposed on men by the nature of things." (Peters 2010 p. 6)

Although we acknowledge, what is essentially the aim of Deweyan pragmatism, that technology often acts as instruments for human behavior, we find it inadequate for establishing an in-depth understanding of the concrete mediative processes occurring between technology and humans.

"For Dewey all tools remain subservient to human life and its interests and aspirations in the broadest sense." (Verbeek 2006, p. 27)

The underlying human processes, such as habits, irrationalism, and susceptibilities, are denounced by Dewey as influencing the human practices as they merely act as tools for contextual and situational purposes (Peters 2010). This is where post-phenomenology enters the arena.

By incorporating theoretical concepts made by Idhe (1990), we have sought to uncover how the different technologies applied during the lockdown were experienced and perceived by the affected individuals, to examine how their relations with the technology was unfolding. Tools are not passive objects used without prior knowledge or purpose. They are, in a post-phenomenological sense, multistable entities affected by the contextual properties that both actively and discreetly shape human behavior, which in this study has represented itself through the accumulated experiences of our informants.

"Multistability signifies how even the simplest technology has no singular essence, but can be taken up for different purposes or stabilities in different contexts." (Aagaard et al. 2018, p. xv)

The empirical material gathered for this study has revealed that there indeed are examples of how a technology or platform is being used for different purposes, depending on the contextual setting. Discord was found to have multiple purposes, as it could act as a group room, used for project work and supervision, or a place to hang out and socialize. Similarly, Microsoft Teams had various functions that also can be related to multistability, as it was functioning as a digital group room but was also used for other purposes, such as facilitating lectures and exams, it even helped facilitate a new relationship between a group and their supervisor.

It is however debatable, whether the concept of multistability and mediation are adequate for achieving and encapsulating the necessary knowledge to understand the influences and thereby actions within the human-technology relation. In many instances, i.e. in designing technology or new work processes, further knowledge can be required to adapt specific perceptions and meanings into contextual properties. Our aim for this study was to provide AAU or similar interests with situated and contextual knowledge that transpired during the lockdown related to the achievement of functionally operational online learning activities, thus refraining from technological designs and implications. Had this been the primary focus, the perceptions from the philosopher of technology Peter-Paul Verbeek, regarding morality and ethics within the human-technology relation, could help elucidate how technological mediation merges with the surrounding environment and what transpires from it, while still operating within the post-phenomenological paradigm (Verbeek 2006).

"Virtually all positions in this new direction in the philosophy of technology, however, take a descriptive point of view. Their main ambition is to analyze the role of technology in the lifeworld." (Mitcham 2006, p. 119)

There exists, in Verbeek's understanding, a problematic element regarding post-phenomenological descriptions of reality, as they merely tend to analyze a technology's role in lifeworlds and neglect the virtues of ethical and moral decisions (Ibid.). It is in the concrete use of a given technology that the morality of things appears, hence a moralization of technology through mediations (Ibid.) Technologies are, in a strict sense, moral agents that pertain to certain ethical embeddings.

"Moral decisions are not made by autonomous subjects, but are co-shaped by the material environment in which humans live." (Mitcham 2006, p. 127)

Morality and ethics shall not, and can not, be regarded as separate entities from technology, rather they shape our actions towards desirable conditions in the constant interactions humans have with the world.

The different technologies described throughout this study all influence the actual processes that occur during online learning activities, thereby mediating elements within the human-technology interaction. We acknowledge that morality and ethics exist within these interactions although, in regards to the problem statement for this study, the primary objective was to explore perceptions and experiences from which PBL and online learning activities can be understood. Ethical considerations should be incorporated into future actions regarding the effects of physical presence, which in this study primarily revolves around the use of webcams. We have multiple statements from informants regarding their perceptions of having a visually mediated element incorporated into online learning activities; often depicted as being intrusive. How to combat personal intrusion can arguably be of a moral and ethical character. As presented in chapter 7, we propose the introduction of guidelines to, among others establish ethical and moral points of reference, for both educators and students in coming situations with online learning activities. Having awareness of the ethical implications when using technology can provide, as described by Verbeek, the measurements of human beings (ibid.).

We do, however, stress the fact that both Ihde and Verbeek, and to some extent Dewey, are prone to neglect the societal implications that technology asserts on human practices, which relates to the notion of critical thinking. We propose, to reflect upon the structural and societal implications, that designers of technological processes related to the incorporation of online learning activities turn towards the philosophical disciplines of critical theory and/or feminist theory. These share similarities in regards to how individuals can engage themselves in uncovering inequality in scientific research, but also within the systems and structures surrounding society. By acknowledging that technology or a situation can be perceived differently depending on individual experience or a marginalized group's perception, perspectives that incorporate voices within multiple levels of power can be achieved for a holistic foundation.

8.2 Discussion of Methods

In this subchapter of the discussion, our methods take the center stage. What the impact of our choices and the circumstances of our methods have been for our results will be discussed. Topics that will be discussed in this subchapter are: doing fieldwork in our own backyard, potential pitfalls with the case study, doing online ethnography, and how we attempted to obtain scientific quality in our work.

8.2.1 In our Own Backyard

A determining aspect of our fieldwork and interviews has been the fact that all of it has taken place at the institution where we are students ourselves, and a majority of it was at the same program as we study, Techno-Anthropology. This is what we refer to as our *own backyard*; working within our own field, institution, and study program. The implications of this for our data and results will in this section be discussed.

The choice for situating ourselves at our own university and using informants in our own program has been a question of access and time. Choosing another educational institution would have resulted in increased time spent negotiation for access, finding informants, and creating rapport with them. Likewise, within AAU we mainly chose informants we had easy access to, while still in our assessment being relevant informants that could contribute. Our project work started a few weeks after the lockdown did, and the choice of staying within our institution meant we could start data gathering immediately and not lose out on potential data during the initial lockdown period. The positive result of this choice was that we hit the ground running. Fieldwork in lectures and establishing contacts for later interviews were set up and planned within the first few weeks of the project starting.

A potential negative aspect of this choice is the fact that we have relations with many of our informants. Several of them are educators in courses we previously attended, some students are friends of ours, and while this relation to them can help establish a more relaxed setting for interviews, it can also be combined with the fact we were placed within the context of our own institution which makes it hard to move between the emic and etic role as desired to do in ethnographic work (Headland 1990).

Several of the educators we engaged made references throughout our interviews back to the past when we were students at the course they currently teach online. For instance, the educator Finn when he stated in our interview:

"*I did the course both asynchronous and synchronous. I don't know if you can remember how the course is structured, but* [...] *Then we discussed the previous texts at the new lecture. Do you remember?"*

Or the educator Michael who referred to our previous interactions with him in an exam:

"*You have been at the same exam, you had to talk about a topic of your own choosing.*"

In both examples from these two educators, we assess the already established relation with them has been beneficial in the interviews. They were able to discuss situations with us which they were dealing with and relate to how it was different from when they had us as students. This meant that they did not need to spend time explaining the context of the course or situation for us; we already knew the context. As such we not only saved time but also better utilized the allocated time we had with them in the interviews; there was less room for misinterpretation of the situation they were describing. The concept of building rapport and the benefits of it has in the last decades seen an increasing favor among reflexive anthropology and that building rapport with informants is recommended (Sherif 2001). For our fieldwork, in some situations rapport was established before the interview or fieldwork even started.

This provided us with an emic view and understanding between us and the informant. As a negative aspect, it meant that an etic view was not reached. Pre-understanding of the context we were discussing, for instance, a lecture, was a timesaver, but the benefit of the etic view and doing ethnographic work as the outsider is that there is a forced explanation. A predefined understanding could be wrong; we might have a different image in our heads of what the informant was explaining, or what the implications of their statement were. If we had had an etic view in these interviews, new understandings or hidden tacit knowledge could have been brought to light and thereby provided further insights. An example of where we did not have a pre-established relationship with an informant was the interview with Thomas Ryberg where he had to explain to us the program he teaches:

"*The Master in IKT & Læring* [ICT and Learning]*, there we meet with the students at the start of the semester and at the end. And that's it. It's been like that since 2000 or something like that, with PBL and pedagogik. We have courses in the fall and projects in the spring."*

He continues this description for some time. This resulted in time used merely describing a program for us, time that could have been used for other relevant data. But it put us as researchers in the etic role and gave us new understandings we might not have had without the outsider perspective.

Another situation that arose with an educator interview where we had a pre-established relationship, happened when Erik suggested how we should approach our work:

"*And just encourage you* [...] *I have a sense of the two of you. Be critical or be as critical as you can.*"

He used his knowledge of us, as former students of him from our previous interactions together, to remind us that we should be critical in our work; that he expected it from us.

As the last topic for this discussion, is that we do not in any sense regarding the work we have done to be auto-ethnographic. Even though we have been active in our own backyard, the subjects of study have not been ourselves but others. Though these others have been close to and familiar to us, we are not researching our own experiences.

It is difficult for us to conclude if this aspect of our ethnographic work has been a negative or positive aspect. We assess that it has had an impact in both directions. Most of all it has had an effect and often it guided our

work. By being aware and transparent of it we hope to further heighten the validity of our work by making the reader aware of this fact and how it affected our work and results.

8.2.2 Pitfalls with Case as Setting

In this section, we will reflect on potential pitfalls in the case methodology. This will be discussed regarding Crowe et al. (2011) and their article on the case study approach. In this they present a table as shown below:

Potential pitfall	Mitigating action
Selecting/conceptualising the wrong case(s) resulting in lack of theoretical generalisations	Developing in-depth knowledge of theoretical and empirical literature, justifying choices made
Collecting large volumes of data that are not relevant to the case or too little to be of any value	Focus data collection in line with research questions, whilst being flexible and allowing different paths to be explored
Defining/bounding the case	Focus on related components (either by time and/or space), be clear what is outside the scope of the case
Lack of rigour	Triangulation, respondent validation, the use of theoretical sampling, transparency throughout the research process
Ethical issues	Anonymise appropriately as cases are often easily identifiable to insiders, informed consent of participants
Integration with theoretical framework	Allow for unexpected issues to emerge and do not force fit, test out preliminary explanations, be clear about epistemological positions in advance

Illustration 11 - Crowe et al.'s list of potential pitfalls and mitigating actions when working with a qualitative case study (2011)

In this table, they highlight some potential pitfalls and mitigating actions that can be done to circumvent them. We will discuss the two most relevant ones for our work, which are large volumes of data and ethical issues.

The first issue, relating to the amount of data, is something we experienced in our research. With the 12 interviews we conducted alongside fieldwork and relevant emails and documents, our dataset was significant, and while being a strength for the analysis of the project it also resulted in an extensive task of getting an overview and coding. As addressed earlier in the report, the data gathering process was accompanied by reflections of scope and what our research sought to understand, and as such, it was an iterative process that helped to continuously shape our scope in both fieldwork and interviews. But even with these considerations, we ended up with a large amount of data that was outside of our scope and thus irrelevant for our report. Some of that data we regard as of little potential for our project, but a majority of it could be used for other projects with different scopes. An example of this is one of our codes, Technical Difficulties. At the start of our research, we thought this aspect would be a major one, but it ended up taking a backseat in our work. Had our scope centered more on technical support rather than the pedagogical and didactic support and PBL, had we been Computer Science students or if we wanted to redesign Microsoft Teams, this data would be highly relevant.

We had to be selective in which themes we wanted to use for our analysis to answer our problem statement and research questions, and while striking this balance of what to include and what to leave out have been

an issue, we assess that we made correct choices in this process as to be both thorough and transparent in our data presentation, while still not cluttering the reader with too much irrelevant information.

Crowe et. al (2011) suggest, as an answer to this pitfall, that the researcher should force data collection in line with the research question, as we described above. Their other mitigating factor is that of being flexible and being open to new paths being shown in the data. As we outlined in our subchapter on data analysis, 3.3, this was something that we strived to do while coding our data. We had both research questions to answer and theoretical directions ready but still open to new insights or directions, had our data shown this to be the case. For this first potential pitfall, we recognize it as a challenge, but through our iterative process and continuing reflections in our work, we have avoided it being a problem for us.

The other potential pitfall we have encountered is ethical issues. When doing casework in a spatial confined setting, such as an educational institution as AAU, a potential pitfall is that anonymized informants can still be recognized by readers of the research that are also insiders of the institution, as statements they make in one way or another can identify them. This can be information they provide, how they speak or comment on things, issues they care about, or people they interact with. All of these can be clues to identify people that otherwise were sought to be anonymized.

This potential pitfall is something we have been aware of and cautious of throughout our work. As described earlier in our project we want this research to be useful in future iterations of online learning activities at AAU, not for those in power to bonk our informants over the head with. Every quote from our empirical material used has undergone scrutiny and considerations: how much of the quote do we need? Is any information in this quote revealing? This has resulted in some quotes being shortened in their presentation. More drastic steps have been taken with other quotes; editorial action has been performed. For some quotes, they first have been transcribed, then translated, and then edited. These are several layers of interpretation from us, the researchers, and raises another potential pitfall. We have through extensive discussion internally whenever editorial actions have been taken, tried to ensure that our informants' intentions have been presented as they are meant. Our goal has been that informants reading our report will be able to recognize themselves and agree on how we have presented them and their statements, while nobody else can.

As with this section and throughout our report, we have tried to do as Crowe et. al prescribes when working in a case study, to:

"… being explicit about how interpretations and conclusions were reached, help readers to judge the trustworthiness of the case study report." (Ibid., p. 8)

8.2.3 Ethnographic work in the Digital

In this section, we discuss two topics related to our ethnographic work online: Self-representation and our level of participation.

In our methods chapter, we delved on the notion of self-representation. Our efforts in placing ourselves online always centered around making sure everybody we interacted with was aware of who we were, researchers, and why we were there. The fact that any statement or action they made, while anonymous, could be recorded and used for research was something we wanted them to be aware of at all times. While we assessed that we reached a high level of consent and awareness from any informants, and while some

students might have been less aware of our presence in their lectures, nobody has been informants for us with direct statements without fully understanding the scope of their actions and consenting.

When conducting online ethnographic work, how to represent yourself as a researcher is an essential issue that must be addressed. For us, most situations were covered by the fact that the online platforms we used required an AAU login and would display who we were. For interactions outside of AAU, on platforms such as Discord, we had our own alias to set up. From this came another benefit of doing ethnographic work in our own backyard. All of our interviews through Discord were, before happening, discussed with the informants on either AAU support platforms such as Microsoft Teams or Zoom, or we had been in contact with the informants via our AAU email or Facebook. An issue of doing online ethnographic work can be the anonymity that usually comes in an online setting with strangers. People can through software or in situations represent themselves as one thing, but without offline interaction or other confirmation, it is impossible to know if the informant indeed is what they claim to be. How we represented ourselves, for instance through AAU credentials, provided security for the informant. We as researchers also did not hide who we are or pretended to be someone else. (Garcia et al. 2009)

Self-representation and the security of knowing who the informants or the researcher are matters, especially since we are working intersubjectively. We are in our interactions with other people co-creating data, and as such, the validity of that data and for it to be useful in making any normative statements also relies on the fact that people are and do what they say they are. A weakness with our work would have been if we had simply found informants online in an anonymous setting from various educational institutions, claiming to be students. While their statements might well be true, we would not be able to verify, and it has been heard of from time to time that people on the internet have lied. The point is the same for our informants. We assess that having our informants being aware of who we were and what they were participating in, helped them to be more open and forthcoming in an online setting compared to someone they would be unsure of.

Another point of discussion in how we did online ethnography was our level of participation. In the methods chapter, we presented how we sought to engage and participate, and did an assessment of our degree of participation. While we in the methods chapter were skeptical, an argument could be that through our interaction with educators and students during lectures, though often only a small amount, we were more active than some of the regular students attending the course. As the educator Finn describes the level of interaction he had in a course:

"*It was the usual few brave that participated in the discussion, and I was unable to pull anybody out of their chairs besides the usual three girls that always participate in the discussions."*

While the point Finn is trying to make relates to the level of engagement he experiences in online learning activities, the point here is that participation in online learning activities, specifically synchronous lectures, does not equal actual engagement. A majority of the students in the lectures we did fieldwork in, were just as passive as we were, or perhaps less as we were unable to confirm to what degree these students were actually at their computer or following the lecture. For ourselves, we knew when we were present, but we were the only participants off-cam we could be sure about. This is something Erik also touches upon; without webcams any student in his lectures could be doing everything other than following his lecture without him knowing:

"*Although if a student or if people are on the computer all the time, I don't know if they're watching porn or taking notes"*

Thomas Ryberg makes the same point, though perhaps more soberly:

“It can be really hard, because you don't receive any feedback, you don't know if… Are people playing World of Warcraft and have their sounds turned off? Are they taking notes? Are they interested?”

There is a fine line between a high degree of participation and being too intrusive and a disturbing element in a classroom. We deliberately chose a level of participation that corresponded to our perceived level of participation from the students within the lectures, to not distinguish us from most of the other students.

8.3 Quality in our Research

In this final subchapter, we will reflect upon the quality of our study, both in terms of the scientific criteria about validity in research and our own goals for our research. Before we can assess the quality of our research, we have to review both the scientific criteria of quality within the paradigms in which we write ourselves into, as well as our aim of the research.

What is scientific quality within the paradigms we are placing ourselves within? Merely by using the word paradigms we are breaking with the traditional positivist understanding of knowledge. In his book *The structure of scientific revolutions* (Kuhn 1996), Thomas Kuhn portrayed how different paradigms ontologically and epistemologically have shared presumptions about the world and science, and how this has shaped their research and understanding of science. This shows how theory-neutral knowledge, as sought by traditional positivists is an unattainable goal. In the following, we will underline which perceptions scientific criteria can be found within ethnographic research, qualitative interviews, and finally STS and how we have worked within these criteria.

In Roger Sanjek's chapter *On Ethnographic Validity* (1990) he reflects upon how ethnographers can achieve validity in their research. He emphasizes how we, as a researcher, should present our choices, both methodological and theoretical, throughout the study and how they have affected the study. Throughout the report we have attempted to present our choices and how it has shaped our study, for instance, what effect choosing AAU as the case has had and what the PBL focus entails. Another central point from his text is that there should be transparency within the fieldnotes, the relation between the actual notes and the analysis should be described and reflected upon. We have tried to be transparent about how we treat our data and fieldnotes in our method chapter.

Within the tradition of qualitative interviewing different epistemological strategies and methods for ensuring objectivity can be found, depending on the nature of the interview as well as the other methods and theories utilized in the study. Alasdair MacIntyre has said that:

“*Objectivity is a moral term before it is a methodological term, and the natural sciences activities it reveals itself as a form of moral activity*” (Kvale and Brinkmann 2014, p. 314).

Objectivity is regarded as a moral term by several others engaged in the objectivity dispute, i.e. Harding and Haraway. But how do we then ensure that we generate valid data? As seen in chapter 7, there is a potential validity issue in our project, since it has been, in some cases, an insuperable problem to separate the experiences caused by the COVID-19 lockdown from the experiences created and mediated by online education. Brinkmann & Kvale (Ibid.) suggest that the researcher throughout the entire process of interviewing, from planning the interview to reporting it, has to continuously be aware of the validity and incorporate it into the actual study. In the design of the interview, they argue that:

"*The validity of the produced knowledge is linked to the design and the appropriateness of the applied methods in relation to the studies topic and purpose*"(Ibid., p. 320).

Concerning this, we deem our theory and methods deployed to investigate our problem as adequate, and our interviews have created valuable knowledge for exploring and investigating our interest. Through the interview situation, validity is related to the credibility of the interviewees' statements according to Brinkmann & Kvale. Concerning this we deem them as credible - we are certain that the persons are who they state they are and we find it unlikely that our interviewees would have any interest in providing false statements regarding their experience.

Within STS, traces of different epistemological strategies and notions can be found. Callon (1984) would argue that we as researchers need to analyze and treat our data by the principle of generalized symmetry, human and non-human entities need to undergo the same analysis. Pinch and Bijker(1984) would argue that we need to be sensitive to the history and adaptation of technologies by various social groups. Haraway (1988) argues that we should be cautious about our own position and how we have situated ourselves in our research, e.g. socially, embodied, and politically, and drawing on Harding's standpoint theory, we should be aware of how our position affects the research done. What all of these STS scholars seem to have in common is the socio-technical understanding of technology. This requires that we, as researchers, are sensitive to the significance of the materiality: matter matters! We regard the social and technical sphere as co-constituting and dialectically affecting each other, because of this we must be aware of the processes and mechanisms of this. We have through our post-phenomenological study of online learning activities investigated how the materiality, the different technologies used within online education, have mediated different experiences for the actors in our study.

Finally, the quality of our research should be assessed on the terms of our goals and aims. From the beginning of the research, we have had a clear ambition of conducting a study, which would be beneficial for the informants and actors involved in it, thus shaping the study continuously. Throughout the period where this study was conducted we internally agreed upon, that our main goal was to conduct a study that would not end up in a drawer somewhere, but rather write and create a project that could be used actively and change practices for the better. Only the future can tell whether we have achieved this goal, it is still too early to make predictions regarding this, but we assess that we have made a solid foundation: an academic study, with a variety of actors at AAU alongside with concrete recommendations for bringing elements and experiences from the online learning activities at AAU into the future.

9 Conclusion

In this conclusion we will answer the problem statement for this project which reads:

What are the effects on Problem-Based Learning at Aalborg University when learning is experienced through technology-mediated online learning activities during the COVID-19 lockdown?

We have outlined how Aalborg University has its own adapted version of Problem-Based Learning, the Aalborg Model, what classifies this model of PBL, and how they in their digitalization strategy have made initiatives to move PBL into the digital realm. Furthermore, we have described the origin of the department Centre for Digitally Supported Learning (CDUL) and their work during the lockdown, specifically how they were moved out of their area of expertise to act as technical support.

We have presented the flow of information regarding the COVID-19 situation concerning online teaching, and how this flow of information has affected the students' inclination to read and comprehend the information.

Through the analysis, we conclude that experiences do profoundly shape an individual's perception regarding how online learning activities unfold. From our technological inquiry, we have found that the use-contexts of technologies, such as platforms as Microsoft Teams or a webcam, are constituting the experiences and thereby perceptions. Furthermore, it is found relevant to highlight that technologies affecting the performance of online learning activities often are being sought adapted into settings similar to physical learning activities, which is where we find examples of elements of disruptive mediation. We have also found that situations within online learning activities can benefit from the shift towards an online domain, as some of the examples of supervision or group work has demonstrated.

Furthermore, we conclude that the technologies applied by educators and students at AAU during the COVID-19 lockdown have been both sources of relief and frustration, as being forced online in all learning activities and prohibited from meeting physically resulted in new structures of working and different degrees of freedom, which often relates to undesirable technological relations.

Through the findings of our analysis, we present four different critiques or topics related to PBL at AAU and how PBL has been affected during the lockdown. We conclude that the link between courses and projects, group work, and collaboration with external partners, all principles of the Aalborg Model, has suffered greatly from transitioning online, while exams have survived relatively unscathed.

Following this, we make a series of recommendations based on our findings. These are:

- **A hybrid approach.** Using the best aspects of synchronous and asynchronous learning activities have potential as a new teaching format.
- **Supervision and distance.** The online format has shown great potential for supervision to open new relations between supervisor and student, and limiting negative aspects that could arise with a distance between subjects.
- **Online curriculum.** The greatest error we have experienced is the attempt to simply transfer the normal PBL curriculum to an online setting. Instead we suggest creating new didactic approaches specifically for the online.

- **Communication.** Communication at AAU should be based on local personnel with an understanding of the local context. Information flow at AAU during the lockdown has done precisely the opposite and been negatively received.
- **Further research.** We call for further research in the areas of what happens to PBL when it moves online, the development of an online PBL curriculum, the effects of webcams in online learning activities, and a call for other researchers to continue the work we have started with this project.

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